

AD709150

INSTRUCTIONAL STRATEGIES:

**Multivariable Studies of Psychological
Processes Related to Instruction**

**Satiation of Divergent and Convergent Thinking
and Its Effect on the Need for Novelty**

John R. Silvestro

Technical Report Number 1

June, 1970

Advanced Research Projects Agency

ARPA Order No. 1269

Monitored by

Office of Naval Research

Contract Number N00014-67-A-0385-006

Reproduced by the
CLEARINGHOUSE
for Federal Scientific & Technical
Information Springfield Va. 22151

Department of Educational Psychology

The Pennsylvania State University

This document has been approved
for public release and sale; its
distribution is unlimited



**BEST
AVAILABLE COPY**

TECHNICAL REPORT NUMBER 1

June, 1970

**Satiation of Divergent and Convergent Thinking
and Its Effect on the Need for Novelty**

John R. Silvestro

ARPA Order Number:	1269
Program Code Number:	60949
Name of Contractor:	Pennsylvania State University University Park, Pennsylvania 16802
Effective Date of Contract:	1968 September 1
Contract Expiration Date:	1970 August 31
Contract Number:	N00014-67-A-0385-0006
Principal Investigator	Francis J. Di Vesta
and Phone Number:	865-6347
Title of Work:	Instructional Strategies

**Sponsored by
Advanced Research Projects Agency**

ARPA Order No. 1269

The Pennsylvania State University
The Graduate School
Department of Educational Psychology

Satiation of Divergent and Convergent Thinking
and Its Effect on the Need for Novelty

A Thesis in
Educational Psychology

by

John R. Silvestro

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

September 1970

Date of Approval:

Francis J. DiVesta
Professor of Educational Psychology
Thesis Adviser

William Rabinowitz, Chairman
Department of Educational Psychology

ACKNOWLEDGMENTS

The author wishes to express his gratitude for the scholarly guidance and personal concern of Dr. Francis J. DiVesta throughout all phases of this investigation. The research reported herein, was supported in part, under a contract providing for a program of research on instructional strategies monitored by the Office of Naval Research (Contract Number N00014-67-A-0385-0006, Advanced Research Projects Agency, Order Number 1269). During the author's tenure as a graduate student he held a National Defense Graduate Fellowship as provided under Title IV of the National Defense Education Act of the United States Office of Education.

TABLE OF CONTENTS

	Page
Acknowledgments	ii
List of Tables	v
List of Figures	vi
Chapter I - Introduction	1
Readiness and the Need for Novelty	1
General Plan and Purpose of the Study	4
Chapter II - Review of the Literature	6
The Relationship between Creativity and the Need for Novelty	6
Novelty and its Relationship to Curiosity	10
The Need for Novelty and Curiosity in Behavior	10
Theoretical Basis for Arousing the Need for Novelty	11
Divergent and Convergent Thinking as Analogous Constructs to Novelty and Monotony	16
Chapter III - Method	18
Design	18
Subjects	19
The Satiation Tasks	22
Divergent-Thinking Tasks	22
Convergent-Thinking Tasks	23
The Experimental Tasks	24

	Page
Procedure	26
Chapter IV - Results	30
Chapter V - Discussion	46
Chapter VI - Summary	59
Bibliography	62
Appendices	66

LIST OF TABLES

Table		Page
1	Means and Standard Deviations of Remote Associates Test Scores for 40 Highest and 40 Lowest Scores	20
2	Means and Standard Deviations of the Remote Associates Test Scores for All Experimental Groups . .	21
3	Summary of Analysis of Variance: RAT Scores between <u>Ss</u> in Different Treatment Groups	22
4	Summary of Analysis of Variance of Nouns Selected over Trials	31
5	Summary of Separate Analyses of Variance for Each Level of Creativity	41
6	Means and Standard Deviations of Total Number of Nouns Selected for All Experimental Groups	42

LIST OF FIGURES

Figure		Page
1	Mean number of nouns selected per trial for each level of creativity	33
2	Mean number of nouns selected per trial for each combination of satiation condition with word class . .	34
3	Mean number of nouns selected by high- and low-creative <u>Ss</u> satiated on convergent- and divergent-thinking tasks	36
4	Mean number of nouns selected by high- and low-creative <u>Ss</u> and where nouns or nonnouns elicited novel responses from <u>E</u>	38
5	Mean number of nouns selected by <u>Ss</u> in convergent and divergent satiation conditions and where nouns or nonnouns elicited novel responses from <u>E</u>	39

CHAPTER I

INTRODUCTION

The past decade has witnessed a plethora of research into the psychological and educational factors that affect the highly creative individual. At the forefront of this examination have been those educators attempting to devise innovative and effective methods of nurturing latent creative talent. In line with this trend, the focus of the present thesis will be devoted to ways of encouraging the need for novelty, which is hypothesized to be a significant component of creativity. Specifically, the antecedent conditions that serve to promote a need for novelty, in both high- and low-creative individuals, were explored in terms of their effects on Ss receptivity to novelty as a stimulus with positive reinforcing properties.

READINESS AND THE NEED FOR NOVELTY

In a study investigating the reinforcing properties of associative novelty for high-creative Ss, Houston and Mednick (1963) tested the hypothesis that the highly creative person has a strong need for novelty. Supported by research on the personality and life-styles of creative people, they contended that the high-creative had a definite preference for novelty, but that manifestations of preference alone did

not necessarily establish the existence of a need. Houston and Mednick attempted to satisfy the need for novelty and observe whether the consequent reinforcement produced by satisfying this need, would increase the elicitation of the behavior immediately preceding the reinforcement. They assumed that if high-creatives do have a need for novel stimulation, the receipt of such stimulation, should reduce the need thereby resulting in a reinforcing state of affairs.

Houston and Mednick employed verbal operant conditioning in their procedure: A series of cards was presented to each subject on an individual basis. On each card was printed a noun and a nonnoun. When the S selected a noun, the E responded with a novel and somewhat unlikely association. When the S chose a nonnoun, the E's response was a highly probable association.

The main finding from their study was that high-creative Ss selected significantly more nouns than did low-creative Ss, thus suggesting a stronger need for novelty. Nouns, with their resulting verbal responses, produced a satisfying reinforcing state of affairs for high-creatives.

The present investigator made an analysis of the Houston and Mednick findings by considering individual creativity as it appears in more realistic contexts. In encounters with the environment, the person is often in a choice-position of either being able to select (i.e., approach) or to reject (i.e., avoid) novel experiences. But, more importantly, entrance into this choice situation is from a previous condition where creativity and novelty may have been present

or absent. Although varying degrees of novelty could have existed in the previous condition, the concern in the present study was only with the more general assumption that novelty was or was not experienced whereas Houston and Mednick were unconcerned with their Ss' "entering characteristics" (i.e., readinesses). It would be ludicrous to even consider the possibility of classifying each S's pre-experiment experiences and cognitions as being either novel or nonnovel. Nevertheless, it is interesting to ponder the differences in the Houston and Mednick measures of novelty that might have arisen between two Ss, if Subject "X" had participated in a creative writing seminar and Subject "Y" had attended an introductory typing class immediately prior to the experiment. Would Subject "X" or Subject "Y" be more likely to respond to novelty after preliminary exposure to these respective environments?

In attempting to answer this question, it was reasoned that more precise conclusions, than those drawn from earlier studies about the high-creative's strong need for novelty, could be obtained by exposing Ss to either of two conditions prior to the experimental task. In one condition, S would be given a series of creative and novel tasks. Conversely, in the other condition, Ss would be exposed to a series of uncreative and unimaginative activities which were void of novelty. Following one of these experiences an S would be administered a task similar to the one employed by Houston and Mednick. Hopefully, this procedure would yield an extended description of the high-creative's need for novelty.

GENERAL PLAN AND PURPOSE OF THE STUDY

On the basis of the rationale briefly described above, the present experiment was designed to determine differential effects if any, on high- and low-creative Ss' need for novelty after being satiated with experiences requiring convergent and divergent thinking. High- or low-creative Ss were identified by the Remote Associates Test (Mednick, 1962). The S was assigned to either a divergent satiation thinking condition or to a convergent satiation thinking condition and performed the requisite tasks in each. Following satiation, the S performed a task which enabled E to identify differences in Ss responsiveness to novelty. Half of the Ss were given novel associations to nonnouns, while the other half were given novel associations to nouns. This procedure was another departure from that employed by Houston and Mednick.

The general hypothesis of the present study was that high-creatives who were satiated with convergent thinking tasks would choose significantly more words of the class (nouns or nonnouns) of words which lead to novel associations than would high-creatives who were satiated with divergent thinking tasks. Among the low-creatives, those Ss who were satiated with convergent thinking experiences were hypothesized to choose more words of the class of words which led to novel associations than the low-creatives who were satiated with divergent thinking experiences. However, since low-creatives are assumed to have a generally weaker need for novelty than high-creatives, the differences between low-creatives in the two satiation

conditions were hypothesized to be not as great as the differences between high-creatives in the two satiation conditions. It was also hypothesized that there would be a significant difference on total need for novelty between those Ss having nouns associated with novel responses and those Ss having nonnouns associated with novel responses. This hypothesis was grounded on the evidence of Cofer and Shvitz (1952), Lambert (1955), and Mednick, Mednick, and Jung (1964) who collectively demonstrated that nouns elicited more responses than adjectives. The latter study is particularly important in that it illustrated the strong preference for nouns among high scorers on the RAT.

Support for these hypotheses would have implications for instructional strategies. Thus, an instructor who wishes to encourage imaginative and novel thinking among high-creatives, might temporarily satiate them with uncreative activities, prior to the time when novelty was sought. The same procedure might also be effective for low-creative persons although, perhaps, less so. Confirmation of the hypothesis might indicate to those educators who totally immerse their students with creativity inducing teaching strategies, that a re-evaluation of their procedures might well benefit the high-creative. Thus, the need for novelty itself is enhanced by occasional departures from novelty; continual experiences with divergent thinking situations tend to make them ordinary, everyday matters to which one becomes accustomed and by which he becomes satiated.

CHAPTER II

REVIEW OF THE LITERATURE

In this chapter, studies in which the relationship between creativity and the need for novelty were investigated will be reviewed first. Then studies in which notions of novelty and curiosity have been related will be reviewed. These topics necessarily involve the issues of need and arousal as motivational constructs and, thus will be taken up next. Finally, investigations which attempted to apply some of the theoretical assumptions concerning the need for novelty to the context of creativity development will be considered.

THE RELATIONSHIP BETWEEN CREATIVITY AND THE NEED FOR NOVELTY

In any research related to testing theoretical assumptions about creativity, the first obstacle encountered is that of delineating the nature of creativity, and of characterizing creative people. The simplest means of defining creativity, is to list the characteristics of creative individuals as found in the studies of creative people. According to Gallagher (1966, p. 46), these characteristics are:

1. Self-assertive, dominant, leading, initiative, self-sufficient.
2. Less repressed, less inhibited, less formal, less conventional, Bohemianly unconcerned, radical, low authoritarian values.

3. Persistence of motive, liking and capacity for work, self-discipline, perseverance, high energy output.
4. Independence and autonomy.
5. Constructively critical, less contented, dissatisfied.
6. Widely informed, wide-ranging interests, versatility.
7. Openness to feelings and emotions, "feeling more important than thinking," more subjective, vitality, enthusiasm.
8. Aesthetic intelligence, aesthetic judgement, higher aesthetic values.
9. Low economic values, poor businessman.
10. Freer expression of what has been called feminine interests and lack of masculine aggressiveness (in men).
11. Little interest in interpersonal relationships, do not want much social interaction, introverted, low on social values, reserved.
12. Emotionally unstable, but capable of using their emotional instability effectively; not well adjusted by psychological definition, but adjusted in the broader sense of being socially happy and useful in work.

Becoming sensitive to these twelve characteristics of the high-creative leads one to the conclusion that the concept of novelty is closely related. If novelty is viewed as a combination of newness, unusualness, or an original way of dealing with the environment, the affinity between the high-creative and novelty becomes apparent. Stein and Heinze (1960) contend that among the elements that comprise the creative process is novelty which results from the relationship between a unique individual and his environment. They further point out that among the nine factors that Guilford contends affect creativity, one factor is that of ideational novelty. Novelty, then,

must be thought of as a product of creative imagination and as such, it is somewhat removed from the limitations that might be placed on it by logic and reason. It is only after a novel idea is regarded as promising and unique, that reason or logic is applied.

Barron (1963) interprets the creative's need for novelty as a strong attraction to "phenomenal fields" which cannot be reduced to an ordered set of principles. High-creatives, he argues, attempt to create new perceptual schemata that will render these "phenomenal fields more intelligible." Thus, the creative individual is willing to abandon systems and structures from the past, and will accept the tenet that reality offers countless possibilities for restructuring and transforming one's life and other lives as well. Golovin (1963) states that the essential characteristic of a creative contribution is that it transcends prior experience, and to some extent, contains a revolt against it. Creative people also prefer to experience and express their individuality and thus prefer stimuli which allow for individualized reactions.

In specific research concerning creativity, the need for novelty is repeatedly found to be a significant factor. Barron (1958) claims that the need for novelty was strongly manifested in highly creative artists and doctoral students. These subjects preferred drawings on the Barron-Welsh Art Scale that were complex and asymmetrical. They also exhibited a preference for the complex in the Rorschach ink-blot. Their novelty was further revealed in their independence of judgment and non-conformity on the Asch lines experiment. Golarn (1962) using

the Revised Art Scale (RA), which was derived from the Barron-Weish Art Scale, sought to determine if creative people try to experience their fullest perceptual, cognitive, and expressive potentials in "their interaction with their environment." After administering the RA scale to various occupational groups and classifications of people, Golann was able to point out that among high-scoring groups on the RA scale, were artists and writers, and among the extreme low-scoring groups were military personnel and neuro-psychiatric inpatients. These results, according to Golann, implied that artists and writers strive to experience encounters with their environment and their selves, in novel ways. Both military personnel and neuropsychiatric inpatients defend against the environment, or deal with it in such a way as to maximize predictability, comprehensibility, and stability. Golann also found that the 30 RA items liked most by the artists were significantly more ambiguous than the 30 RA items disliked most by the artists. This seems to indicate that ambiguity, which can be defined as one source of novelty, was valued highly by the high-creatives.

There appears to be sufficient evidence that creativity and the need for novelty are inextricably bound together. It can even be argued that a strong need for novelty is a necessary prerequisite for creativity to manifest itself. The question that must now be attended to is "how best can the need for novelty be augmented and aroused so as to induce optimal levels of creative behavior?"

NOVELTY AND ITS RELATIONSHIP TO CURIOSITY

Novelty is inescapably linked with curiosity. Both represent an urge to remove oneself from monotony and boredom and to seek some new form of stimulation. Curiosity, like novelty, is an essential ingredient for creativity. As early as 1908 McDougall claimed that curiosity "is at the base of many of man's most splendid achievements, for rooted in it are his speculative and scientific tendencies." Both novelty and curiosity are needed to induce exploratory behavior, so necessary for exploration of the unknown, the untested, and the unfamiliar. The curiosity drive is increased in strength by unfamiliar and novel surroundings (Taylor, 1949). In other studies to be reviewed below the mutual dependence of novelty and curiosity are accentuated, and are at times conceptually indistinguishable.

THE NEED FOR NOVELTY AND CURIOSITY IN BEHAVIOR

Of great importance are the motivational aspects of novelty and curiosity upon creative functioning. Maddi (1965) describes novelty as a "purposeful surging that leads in the direction of creative acts." He notes two motives that lead to the consistent production of novel and valuable acts, the need for quality and the need for novelty. For the person with a need for novelty, the unusual, the rare, the unlikely, and the unexpected, will all be highly rewarding. In two research studies correlating novelty with other variables, Maddi found that the correlations between novelty of productions and the tendency to prefer novel endings to the stems of well-known similes were both significant;

.45 and .47 respectively. Maddi concluded that people who produce creative acts have the need for novelty as part of their motivational complex.

White (1961), too, points to novelty as a basic need; as a constant desire to raise one's level of stimulation and excitement. Such notions explain in part, why people engage in such dangerous sports as auto racing and mountain climbing. A child at play seems to need frequent novelty in his stimulus field in order to maintain his interest. Even typically conservative people usually seek a stimulus field characterized by at least some minor differences in sameness, along with certain features that are decidedly novel. In commenting on the essential human need for novelty Platt (1961, p. 410) says:

The mind seeks to escape from the certainties of the diffuse light that remains during stimulus deprivation. It is bored by the certainties of any humdrum job or routine entertainment . . . What it seeks is the variable light signals, and what it processes and responds to on all levels, is information - the changing, the novel, the surprising, and the uncertain.

Platt cautions that the "mind" also demands pattern, for there is a need for regularity in input information. However, these patterns must develop into new patterns, or else they too will become boring.

THEORETICAL BASIS FOR AROUSING THE NEED FOR NOVELTY

How can the need for novelty be aroused in order that it may find a productive outlet in creative activity? A particularly invaluable study concerning this question was done by Maddi et al. (1962). Their work was primarily concerned with measuring desire for novelty and the

tendency to think in novel ways, as reflected by plots and character treatment in original stories produced by their Ss. Maddi et al. compared two theories for arousing novelty. On the one hand, Hull's deprivation model held that monotony increases both desire for novelty and novelty of production. On the other hand, McClelland's (Atkinson, 1958) theory suggested that it is novel stimulation that increases desire for novelty and novelty of productions. There was some evidence to support both views. Some creative writers for example, consider constant unstimulating conditions as most likely to whet their appetite for novelty, while others suggest that creative achievement was nurtured by pursuit of a wide range of changing conditions.

Their study involved dividing the Ss into either a monotony or a novelty activity group. The Ss in the monotony group were told to listen to a recording which was a detailed description of streets, buildings, and stores of a typical small town. They were further instructed that later in the experiment, they would be asked questions about the kinds of factors that influence the quality of radio programs. The Ss in the novelty group were given the same instructions about the questions to be asked, but they were first allowed to listen to a 12 minute recording that was intended to be novel. The recording was an interpretation of contemporary American culture made on the basis of presumed archaeological finds in the year 3500. After their respective activities, both groups composed stories, for television directors, suggested by various pictures shown to them.

The novelty of their productions was evaluated on such factors as unusual roles designated to the characters, the characters that were introduced, the novelty of the plots, and the novelty or unexpectedness of their endings. A scoring system devised by McClelland (Atkinson, 1958) was used to measure desire for novelty. Scores of 1, 0, and -1 were assigned to such categories as novelty, imagery, doubtful imagery, and unrelated imagery.

The results indicated that the monotony satiated group desired significantly more novelty than the novelty satiated group. However, the "novelty of production" scores were significantly higher for the novelty satiated group than for the monotony group. Thus, monotonous stimulation increased the desire for novelty in imaginative productions, but it decreased the degree to which the productions were novel, thereby suggesting that perhaps the period of incessant monotony produced a temporary decrease in the ability to initiate the more active forms of thought.

Maddi (1961) also argues against excessive novelty. He claims that extremely novel situations, such as those in which a large proportion of the elements differ from the ones of immediately preceding situations, or those including elements which are unique in the life history of the organism, appear to produce avoidance behavior. Situations lacking in novelty, such as those in which a negligible proportion of the elements differ from those of immediately preceding situations, also tend to produce avoidance behavior. A similar point of view has been suggested by McClelland (1953) who indicates the

moderate degrees of discrepancy or change are affectively pleasant and productive of motivational states while extreme degrees of change are affectively unpleasant and do not encourage increases in motivation.

According to McClelland (1953, p. 43):

Positive affect is the result of smaller discrepancies of a sensory or perceptual event from the adaptation level of the organism; negative affect is the result of larger discrepancies.

McClelland cites a classic study by Angler (1903) to illustrate this theory. Angler asked his Ss to divide a 160 mm line unequally at the most pleasing place on either side of the midpoint. The average frequencies of choices per 5 mm unit between 5-25 mm, 25-45 mm, 45-65 mm, and 65-75 mm on both sides of the midpoint were plotted. The data from this study clearly illustrates that Ss did not like to divide the line near its extremities on either side. It is assumed that this same type of reaction occurs when Ss are exposed to markedly novel stimuli; an aversive contrast to the normal perceptual field.

In research with animals, Welker (1961) proposed that an excessive degree of novelty will be avoided and only moderate amounts of novel stimuli are approached. He also discovered that prolonged exposure to highly novel stimuli resulted in aversive and discomfort reactions in animals. Particularly noteworthy was the fact that an organism from a restricted environment, where novelty was minimal, was more apt to avoid a stronger level of novelty than was an organism with previous novel experience.

Berlyne's is probably the most thorough investigation of the means by which novelty and curiosity may be aroused. In work with rats,

Berlyne (1950) postulated that "as a curiosity-arousing stimulus continues to affect an organism's receptors, curiosity will diminish." This postulate was defended in accordance with Hull's (1943) statement of reactive inhibition (I_r) that as a response continues or is repeated, there occurs a motivation towards its cessation. The curiosity response, too, will succumb to increasing reactive inhibition until it falls below a reaction threshold (S^L_R). These assumptions were confirmed in Berlyne's experimentation with rats. He found significantly less exploratory behavior among rats who were satiated with novel stimuli than among rats who were satiated with monotonous stimuli. They spent more time exploring a novel stimulus, than they did exploring stimuli which they had been previously allowed to explore. Furthermore, the rats spent less time exploring stimuli the second time they were encountered, thereby implying that novelty wears off quite rapidly. In describing the characteristics of novel stimuli, Berlyne (1960) notes that they have not yet had a chance to lose the qualities that all stimuli originally possess. All stimuli are novel at some time, but lose their novelty with repeated occurrence.

It follows from the work of Berlyne, Maddi, and McClelland, reviewed above, that to motivate a person to seek out novelty, the stimuli in his environment must be changed suddenly from monotonous to novel. An individual who is continually exposed to novel stimuli, will lose his desire for novelty. One who is satiated with monotonous stimuli, lacking in novelty, surprisingness, uncertainty, and complexity, will react positively to novel experiences to escape from

boredom. Such a person can be relieved of high arousal state by specific exploratory responses.

DIVERGENT AND CONVERGENT THINKING AS ANALOGOUS CONSTRUCTS TO NOVELTY
AND MONOTONY

The theories on the arousal of the need for novelty must now be integrated into the context of creativity. Keeping in mind that the ultimate objective of this thesis is to investigate methods to arouse the need for novelty so as to promote creative behavior, the question that must be answered is, "What conditions or manipulations can be imposed to maximize the need for novelty?"

In studies of creativity, two types of thinking are inevitably discussed and examined: convergent thinking and divergent thinking (Guilford, 1959). Convergent thinking tends toward retention of the known, learning the predetermined, and conserving what is; it is a process of intellectual acquisitiveness and conformity. Divergent thinking tends toward revising the known, exploring the undetermined, and constructing what might be; it is a type of intellectual inventiveness and innovation. Convergent thinking may be compared to boring, monotonous stimulation, since it is normative, common, highly familiar, and usual. It is a type of thinking which lacks short-term novelty. Conversely, divergent thinking is highly similar to novel stimulation in that it is in some degree new, unusual, strange, odd, or different.

By extrapolation, the principles of arousal, developed in conjunction with studies of novelty and curiosity, appear to apply

equally to both convergent and divergent thinking. Thus, if an individual is satiated with convergent thinking experiences his curiosity drive should be aroused and he should seek out novelty until this drive is reduced. If an individual is satiated with divergent thinking activities, it would seem likely that the divergent tasks would gradually lose their novelty and due to the reactive inhibition principle, the individual would avoid novelty.

CHAPTER III

METHOD

DESIGN

The overall design implied a $2 \times 2 \times 2$ factorial analysis of variance with two of the factors representing treatments and one representing levels. The high- and low-creatives comprised the two levels of the creativity dimension. Each level of creativity was divided into two treatment conditions; Ss were either satiated with convergent thinking tasks or divergent thinking tasks, thus constituting one of the treatment variables. These were orthogonally crossed with the third dimension, word class. The word class dimension was introduced to determine whether Ss would select more nouns when E responded with novel associations to either nouns or nonnouns which were visually presented to each S individually. Thus for half of the Ss, the selection of a noun served to elicit a novel response from E, while for all other Ss, nonnouns elicited the novel response. In certain of the analyses the effect of trials was also analyzed by blocking the responses to the 180 slides into nine trials of 20 items each. Since the filler items in each block were eliminated for this analysis, the total possible score for each block was 18.

SUBJECTS

The Ss were undergraduate students enrolled in the Introductory educational psychology course at The Pennsylvania State University. Extra credit toward the course grade was earned by participation in the experiment. A total of 181 took the RAT. Of this group there were 80 Ss in the main experiment. All Ss were administered Form 1 of the Remote Associates Test (RAT) according to standardized procedures described in the manual for the test (Mednick and Mednick, 1967). None of the Ss had taken the RAT before. The native language of all Ss was English. Total scores were based on the number of correct answers to the 30 test items, thereby allowing for a maximum score of 30 and a minimum score of 0. The Ss with the 40 highest and 40 lowest scores on the RAT were then selected to participate in the experiment in order to ensure extreme groups for the levels variable. In cases where there were several Ss obtaining the same cut-off score in either the high or low groups, the Ss were selected at random.

The mean RAT score for all Ss was 14.59 and the standard deviation was 4.83. The whole range of scores was from 6 to 28, with the scores for the 40 high-creatives ranging from 19-28, and the scores for the 40 low-creatives ranging from 6-12. The means and standard deviations for the high- and low-creative groups are summarized in Table 1. The reader will note that the variance for scores in the high group is nearly twice that of the variance of scores for the low group. This fact reflects the greater heterogeneity of the high RAT scorers probably

Table 1
Means and Standard Deviations of Remote Associates
Test Scores for 40 Highest and 40 Lowest Scores

RAT Group	Mean	S.D.
High	21.37	2.19
Low	8.52	1.48

because there are fewer of such people in the population from which this sample was drawn.

The high- and low-creative groups were each broken down into four treatment groups. The Ss were assigned to each condition by reference to a table of random digits. Thus, there were four groups of ten Ss each among the high-creatives and the same for the low-creatives. The means and standard deviations of RAT scores for all experimental groups are summarized in Table 2.

Although the homogeneity of the groups at each creativity level was apparent by inspection, a simple randomized analysis of variance was made to compare results of the high- and low-creatives in the four different treatment groups at each level. The resulting F-test proved to be nonsignificant with F values less than 1 (as shown in Table 3), thereby supporting the assumption that all groups at each level of creativity were similar after Ss were assigned at random.

Table 2
Means and Standard Deviations of the Remote
Associates Test Scores for All Experimental Groups

RAT Group	Satiation Condition	Word Class	Mean	S.D.
High Creative	Convergent	Nouns	21.2	2.03
		Nonnouns	21.5	2.15
	Divergent	Nouns	21.1	1.48
		Nonnouns	21.7	2.64
Low Creative	Convergent	Nouns	8.9	1.70
		Nonnouns	8.5	1.56
	Divergent	Nouns	8.4	1.56
		Nonnouns	8.3	1.10

Table 3
Summary of Analysis of Variance:
RAT Scores between Ss in Different Treatment Groups

Source	High Creatives			Low Creatives		
	df	MS	F	df	MS	F
Between Groups	3	.75	.14	3	.69	.29
Within Groups	36	5.30		36	2.38	
Total	39			39		

THE SATIATION TASKS

In order to satiate each S with convergent or divergent thinking, two series of tasks were developed: one set was designed to elicit common, unoriginal, and monotonous responses; the other set demanded imagination, originality, ingenuity, and variety from the S. These tasks are described, as they were presented to the S, in Appendices A and B.

Divergent-Thinking Tasks

A series of five different tasks were used to satiate divergent thinking. In the first task S was required to construct an imaginative crossword puzzle. He was provided a blank, 5-space by 5-space puzzle matrix with sufficient writing area to record the clues to each word in the puzzle. Instructions concerning how best to produce the puzzle were printed at the top of the sheet.

The second task required the construction of unique designs with plastic tiles. The materials consisted of the contents of a Haisam Playtiles children's game, set number 21. The set contained a 9-inch x 12-inch pegboard on which the tile constructions could be assembled. The individual tiles measured 3/8-inch x 7/8-inch. There were 120 tiles used for the experiment; 30 red, 30 yellow, 30 white, and 30 blue. Each tile had two prongs on its underside which fit securely into the pegboard holes.

The third task was the suffixes test. The directions at the top of the sheet, called for the S to write as many words as possible ending with the suffix ABLE. A sample word was given, below which were empty spaces for Ss to list their words.

The fourth task was the consequences test. It required the S to list possible consequences of the following hypothetical situation: "What would the results be if people no longer needed or wanted sleep?" There was sufficient space below the directions for Ss to record their responses.

The fifth task was the utility test, in which Ss listed as many different uses of a brick and a pencil as possible. The paper was divided in half by the directions for listing the uses of a pencil, and thus there were two separate areas on the paper for Ss to record their answers.

Convergent-Thinking Tasks

In the convergent satiation thinking condition, four tasks, paralleling those used for divergent thinking, were employed. The

first task called for the solution to a simple crossword puzzle, mimeographed on an 8-1/2 x 11 inch sheet of paper. The puzzle was 8 blocks across and 7 blocks down. The clues for the "across" words were printed on the upper left-hand portion of the sheet and the clues for the "down" words were printed on the lower right-hand portion of the sheet. All spaces on the puzzle were numbered as were the clue words.

The second task was a plastic tile construction task using the same materials as those used in the satiation of divergent thinking condition. In this task, however, the S was asked to place all of the tiles of each color, into the same group at one of the designated corners of the pegboard in order to form four large rectangles of the following colors: red, yellow, white, and blue.

The third task was the sentence order test. The directions called for the S to arrange 10 sets of three sentences in a meaningful order. An example was given, beneath which were the test sentences. This test was derived from Reports from the Psychological Laboratory, the University of Southern California (1965).

The fourth task was the word-group naming test, also derived from reports from the Psychological Laboratory (1965). The directions instructed the S to give a class or category name to each of 10 sets of five words. The word sets were listed below the directions, with an answer blank beneath each set of words.

THE EXPERIMENTAL TASKS

In order to determine the relative strength of each S's need for novelty after the respective satiation conditions, 180 2" x 2" slides

were presented by means of a Kodak Carousel 800 slide projector. On each was a pair of words, centered and typed one above the other, in capital letters.

The words for the slides were taken from the Palermo and Jenkins (1964) and from the Gerow and Pollio (1965) word association norms. Both sets of norms contain words most frequently occurring in the English language, associations to each of these words, and frequency of these associations. On 160 of the slides there was a pair of words consisting of a noun and a nonnoun. Words from each category were paired by a random number procedure. Once paired, the noun or nonnoun was randomly assigned to the top position on the slide.

The remaining 20 slides, or every ninth slide in the series of 180, was printed with a pair of nouns. These filler items were disregarded in the final results. They were used to prevent the S from gaining insight into the experimental method. These words were selected in the same manner as the words used for the 160 slides described above.

To each of the 160 critical items E responded with either novel or common associations. The common associations were primary associates of the word (Palermo and Jenkins, 1964; Gerow and Pollio, 1965). Novel associations were defined as words with very low or no probability of association to the stimulus word. (In the latter case E supplied the word.) To each of the 20 filler items, E responded with common associates. These common associations were also taken from the Palermo and Jenkins and the Gerow and Pollio norms. The word pairs

that appeared on the slides, and the novel and common associations that were given verbally by the E to each word are presented in Appendix C.

PROCEDURE

The high-creative and low-creative Ss were each randomly assigned to one of four experimental groups. The divergent thinking tasks were assigned to half the Ss in each group and the convergent-thinking tasks were assigned to the other half of the group. These two treatments were crossed orthogonally with the kind of feedback provided by E, i.e. E orally presented either a novel or common associate to S's response depending on the nature of the S's response and on whether the class of nouns or nonnouns was being reinforced.

All Ss were seen individually in an experimentation room designed to keep outside interference and noise at a minimum. The room was approximately 8' x 10'. In the center of the room was a utility table on which the S performed the assigned tasks, and which also served as a base from which to project the slides. The E sat to the rear of the room in order to prevent distraction of S during the experiment.

When the S performed the divergent thinking tasks he was given the directions for each task before he began, and then was allotted a specific time period in which to complete the task. The E used a Brenet Number 5 stopwatch for this purpose. A time limit was placed on these tasks because of their open-ended nature; otherwise an indefinite period of time might have been used by Ss to complete them. These limits were derived for each of the tasks from the performance of Ss in an earlier pilot study. The E left the experimentation room once

the S was prepared to begin the task and all questions and problems had been resolved. This procedure was intended to minimize distraction and experimenter influence, and to maximize, thereby, the potency of the satiation condition while S performed the task. The E then returned to the room when time had expired.

The time limits for the tasks were as follows: (1) construction of an original crossword puzzle - 8 minutes; (2) construction of an imaginative design using Playtiles - 5 minutes; (3) suffixes test - 5 minutes; (4) unusual consequences test - 5 minutes; (5) utility test or test of unusual uses - 7 minutes.

The procedure employed in administering the convergent thinking tasks was similar except for the fact that no time limit was imposed on the Ss. The results of an earlier pilot study revealed that all Ss completed these tasks in about the same amount of time, apparently due to the hit or miss nature of the tasks and the restricted range of possible answers. As in the performance of the divergent thinking tasks, the E left the room when the S was prepared to begin each task and returned when the task was completed. The E determined when each task was completed by observing the S through a small glass window on the door of the experimentation room. The Ss were given the following four tasks: (1) solving a crossword puzzle; (2) constructing a specified design with Playtiles; (3) answering the sentence order test; and (4) answering the word-group naming test.

Following performance of either set of tasks, the E read the following instructions:

I am going to show you some slides, one at a time, on the wall facing you. On each slide there are two words. I want you to look at both words and say the one you like best out loud. In response to the word that you select, I will say a word or give you an association. For example, if the words "farm" and "pencil" appear on a slide and you choose "pencil" I might respond with "paper." If instead you chose "farm" I might say "barn." So for each slide you will choose one of the two words and say it out loud. Then I will give you a response word. Are there any questions?

The E then told each S to move his chair up closer to the wall of the room in order to better see the projected slides. This was also done so that the S would not be distracted or influenced by cues from E during the slide series. It was believed that this procedure eliminated experimenter influence over the choice of words by the S. The series of 180 slides was then presented. The number of nouns and nonnouns selected by S was recorded by underscoring either "noun" or "nonnoun" for each pair of words to indicate the S's choice of words.

As indicated above, E responded with a novel association when nouns were chosen by Ss in half of the groups and with a novel association when nonnouns were chosen by Ss, the other half of the groups. As an example, assume that nouns were to be reinforced by novel associations, and that if the S had chosen the noun "baby" the E would have responded with "automobile." On the other hand, if S had chosen the nonnoun "green," the E would have responded with "grass." The procedure was reversed, when nonnouns were to be reinforced with novel associations. Thus, for the same pair described above, if S had chosen "baby," the E would now respond with the common associate "cry." Conversely, if the S had chosen "green," the E would respond with the novel associate "lake."

There were 20 filler items comprised of noun pairs included in the set of 180 slides. Regardless of which word the S chose on these pairs the E always responded with a common associate of that word.

After the experimental task was completed the E interviewed the S to determine the S's perception of the purpose of the experiment and the intent of the E (see Appendix D).

CHAPTER IV

RESULTS

A repeated measures analysis of variance of the number of nouns selected by S over trials was made. A summary of this analysis is presented in Table 4. There it may be seen that the main effects of Trials was significant ($p < .01$) as were the Creativity x Trials Interaction ($p < .05$) and the Satiation x Word Class x Trials interaction ($p < .01$). It should be noted, however, that the significant main effect due to Trials does not imply, in this case, that Ss acquired the principle that governed E's reinforcement rule i.e., which class of words led to the evocation of novel associations. Thus, while there were differences among trials there was no significant difference between the mean number of nouns selected for the first and ninth-trials indicating that the overall trend was not significantly different from zero. The post-experiment interviews lend credence to these results. None of the Ss suggested that they were conscious of the contingent relationship of nouns or nonnouns to novel or common associations.

Although the Creativity x Trials Interaction was significant, there was no significant difference between first and ninth-trial

Table 4
Summary of Analysis of Variance of Nouns Selected over Trials

Source	df	MS	F
Between S_s			
Creativity	1	42.05	1.94
Satiation	1	.67	0.03
Word Class	1	24.20	1.12
Creativity x Satiation	1	98.27	4.53*
Creativity x Word Class	1	125.00	5.76*
Satiation x Word Class	1	906.76	41.78**
Creativity x Satiation x Word Class	1	149.42	6.88*
Error _b	72	21.70	
Within S_s			
Trials	8	14.36	3.84**
Creativity x Trials	8	8.29	2.22*
Satiation x Trials	8	4.43	1.18
Word Class x Trials	8	2.19	0.59
Creativity x Satiation x Trials	8	7.44	1.99
Creativity x Word Class x Trials	8	3.01	0.80
Satiation x Word Class x Trials	8	19.09	5.11**
Creativity x Satiation x Word Class x Trials	8	9.00	2.41*
Error _w	576	3.74	

* $p < .05$

** $p < .01$

means for both high- and low-creative Ss (see Figure 1). However, the significant Creativity x Trials x Word Class Interaction when plotted (see Figure 2) shows discernible differences between treatment groups. There was a general increase in the number of nouns selected over trials for both the Convergent Satiation-Nouns Novel group and the Divergent Satiation-Nonnouns Novel group. On the other hand, both the Divergent Satiation-Nouns Novel group and the Convergent Satiation-Nonnouns Novel group tended to select fewer nouns over trials.

To fully comprehend the implications of the results in Figure 2 and all other portions of the data analysis, it is important that the reader recognize the artifacts of the method of reporting the score per trial and total score for each S. The score for each S was always based on the number of nouns selected, regardless of whether nouns or nonnouns elicited novel responses. Thus, for example, if S was reinforced with novel associations to nonnouns, and if his responses suggested a preference for novel associations, his total score would be lower than that of an S reinforced with novel associations to nouns under the same circumstances. In effect, Ss who were reinforced with novel associations to nouns, and who obtained relatively high total scores were exhibiting a similar need for novelty as Ss who were reinforced with novel associations to nonnouns and who thus obtained low total scores.

Returning to the interpretation of the data displayed in Figure 2, it becomes apparent that the Convergent Satiation-Nouns Novel and Convergent Satiation-Nonnouns Novel groups acquired a preference for

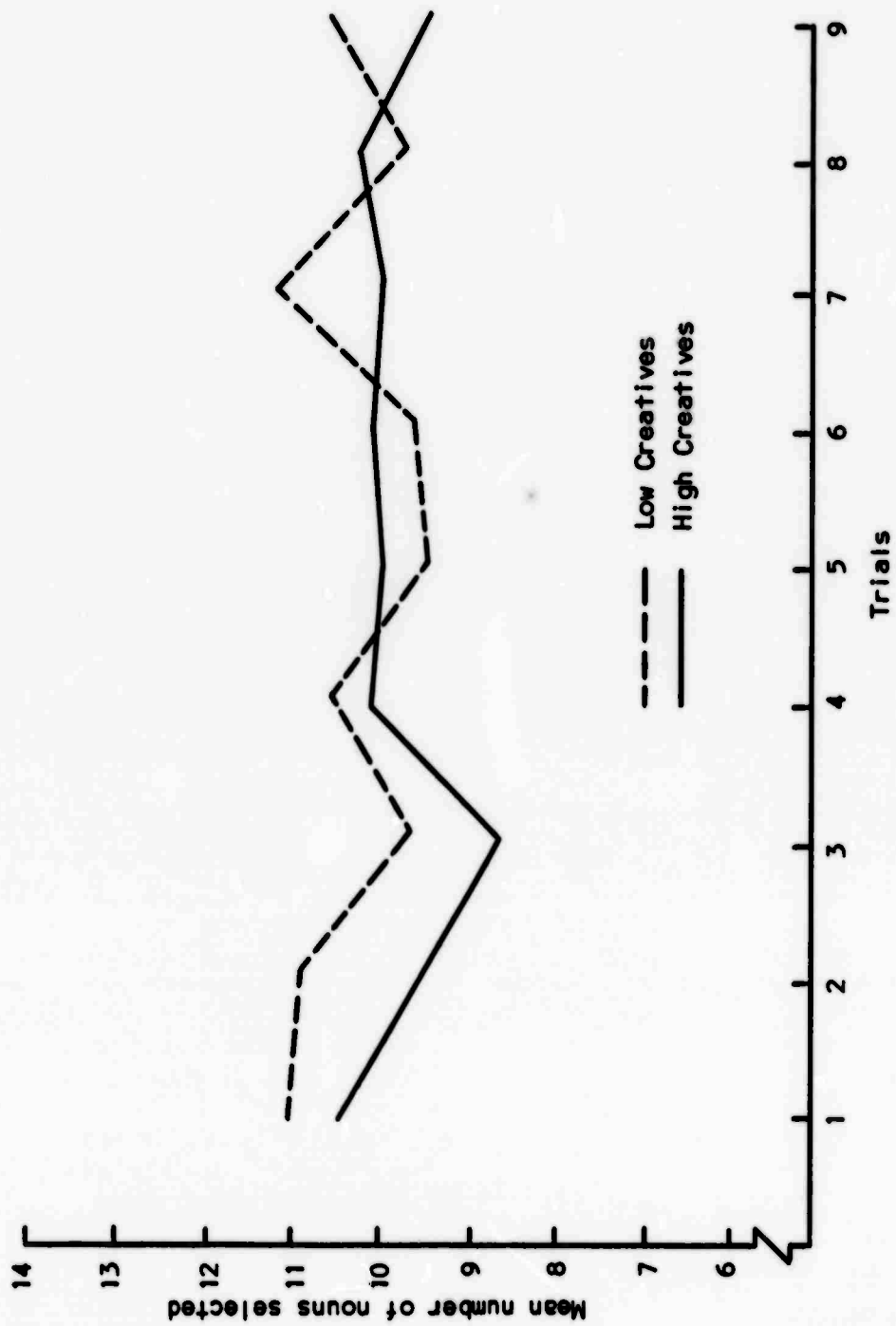


Figure 1 - Mean number of nouns selected per trial for each level of creativity.

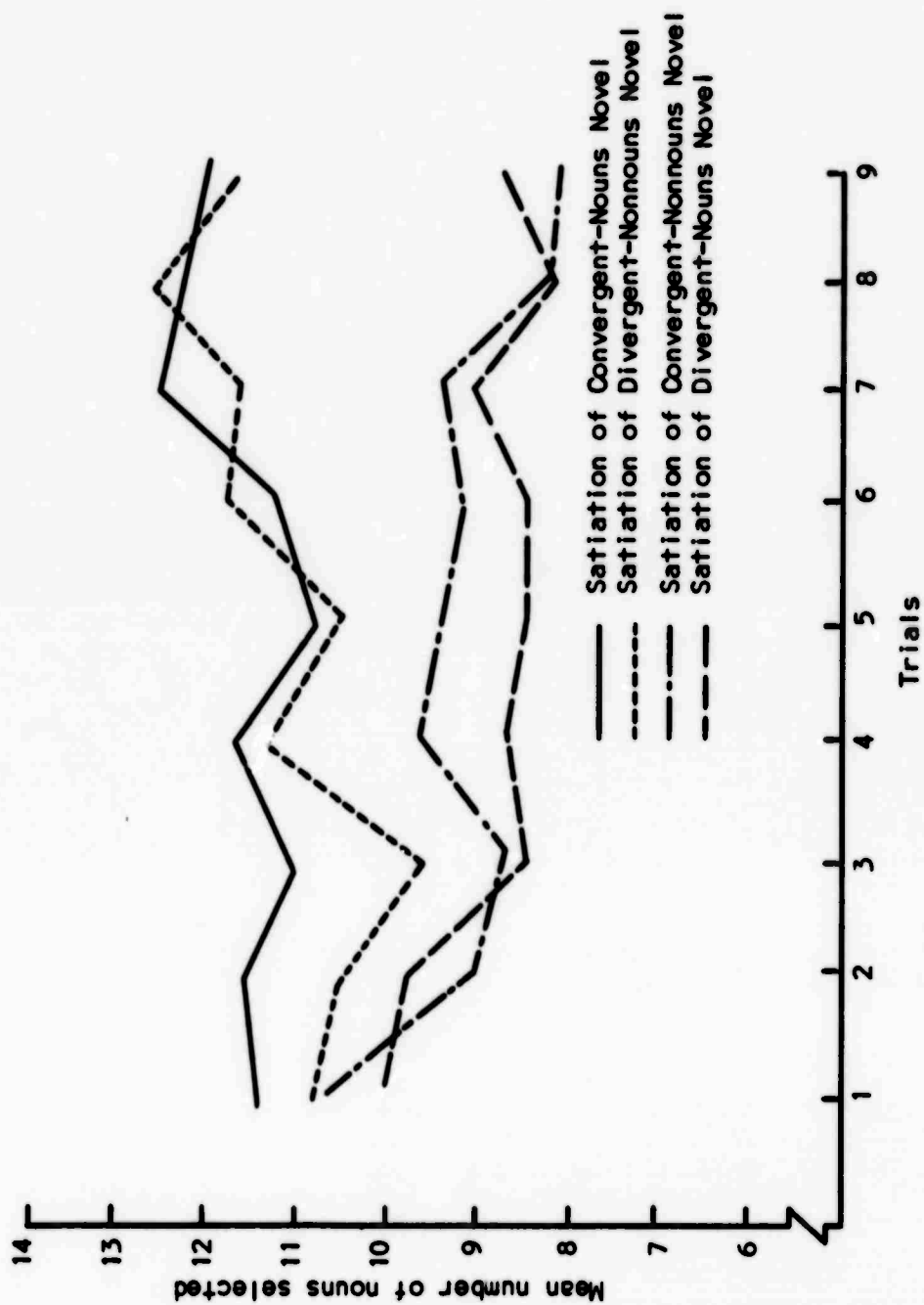


Figure 2 - Mean number of nouns selected per trial for each combination of satiation condition with word class.

novel associations. In the former group, preference for novel associations was manifested by the selection of nouns, while for the latter group it was manifested by the tendency of not choosing nouns (i.e., the S chose nonnouns). The opposite effect is inferred from the data generated in the two Divergent Satiation groups; that is, the Ss in these groups tended to select the type of word which led to non-novel associations from E.

As can be seen in Table 4, the interaction between Creativity x Satiation yielded $F(1,72) = 5.07, p < .05$; the interaction due to Creativity x Word Class yielded $F(1,72) = 5.51, p < .05$; that due to Satiation x Word Class yielded $F(1,72) = 38.87, p < .01$; and the triple interaction of Creativity x Word Class x Satiation yielded $F(1,72) = 7.52, p < .01$. The mean number of nouns selected by Ss in the groups represented in the Creativity x Satiation Interaction are presented in Figure 3. In the partitioning of the sums of squares for analyzing main effects in the analysis of variance, the effects of these two factors (creativity and satiation) would tend to counteract each other thus leading to no significant differences. However, it was expected that if the hypothesized effects were obtained they should be reflected in the interaction, as they were low-creatives, satiated with convergent thinking tasks, selected more nouns ($\bar{X} = 96.7$) than did high-creatives ($\bar{X} = 85.3$). Under divergent satiation conditions, however, high-creatives chose more nouns ($\bar{X} = 91.4$) than did low-creatives ($\bar{X} = 88.5$). Overall, there was a preference for nouns by all Ss, with the mean number of nouns selected being 90.43 and the mean number of

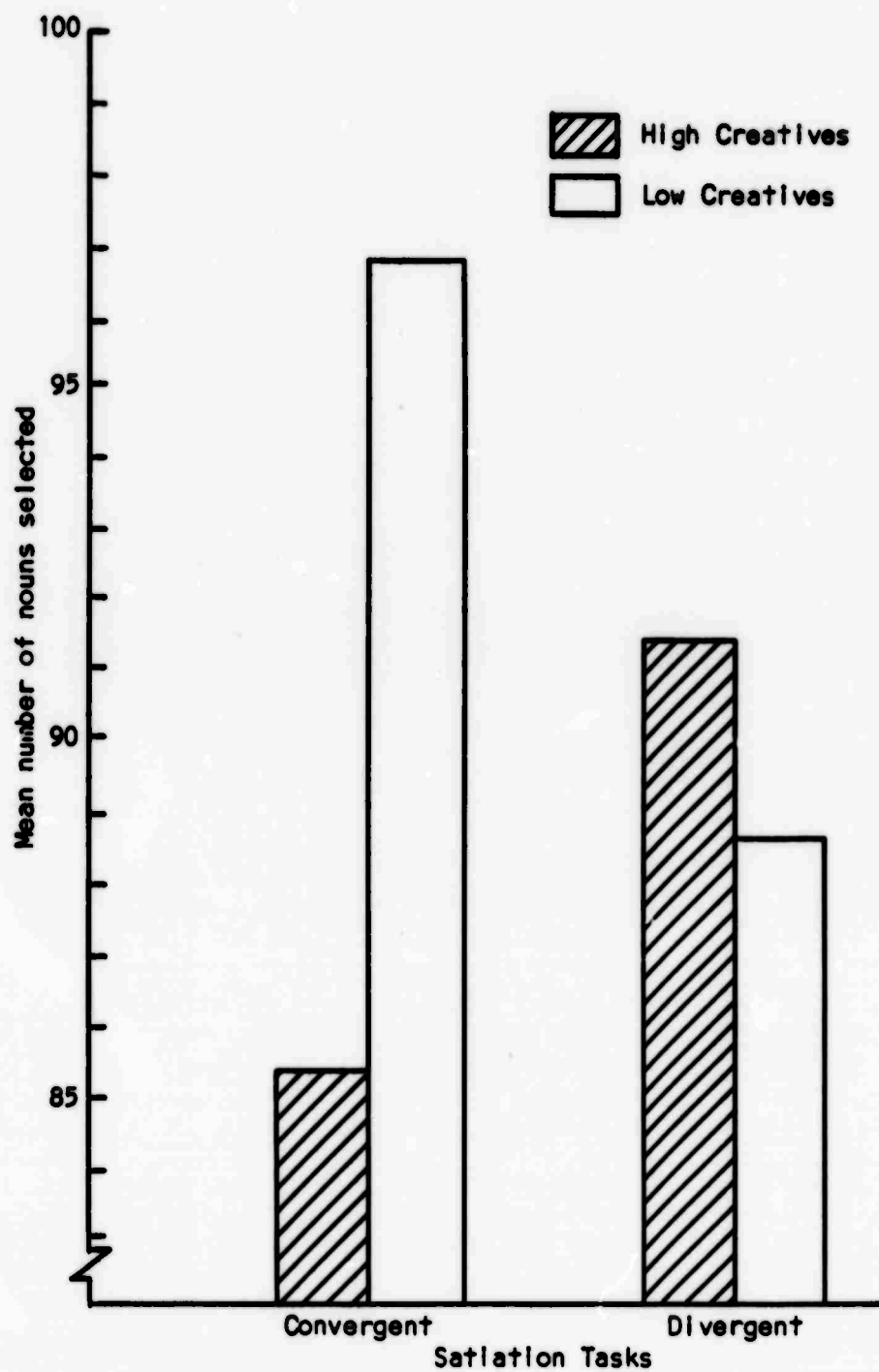


Figure 3 - Mean number of nouns selected by high- and low-creative Ss satiated on convergent- and divergent-thinking tasks.

nonnouns selected being 69.6. This finding confirms the prediction that Ss prefer to select nouns over nonnouns and justifies the incorporation of this factor into the design of the study.

The significant Creativity x Word Class interaction indicates that high-creatives responded more to novel associations than low-creatives. The data in Figure 4 shows that when nouns were novel, high-creatives selected more nouns ($\bar{X} = 93.75$) than did low-creatives ($\bar{X} = 90.6$). When nonnouns were novel, low-creatives chose more nouns ($\bar{X} = 94.6$) than high-creatives ($\bar{X} = 82.9$). These data imply that the low-creatives were less influenced by novelty than were the high-creatives, who chose more nonnouns when E responded to nonnouns with novel associations.

The data for groups represented in the Satiation x Word Class interaction are summarized in Figure 5. These data support the major hypothesis that Ss satiated with convergent thinking tasks would respond more to novel associations than would those Ss satiated with divergent thinking tasks. Thus, the Convergent Satiation-Nouns Novel group chose more nouns ($\bar{X} = 102.5$) than did the Divergent Satiation-Nouns Novel group ($\bar{X} = 81.8$). Likewise, the Convergent Satiation-Nonnouns Novel group chose fewer nouns ($\bar{X} = 79.4$) and therefore, more nonnouns, than the Divergent-Satiation Nonnouns Novel group ($\bar{X} = 81.8$). If the choice of words reinforced with novel associations is accepted as an index of the need for novelty, then it can be inferred from these data that the strength of this need was differentially influenced by the divergent and convergent thinking tasks. It is also noteworthy

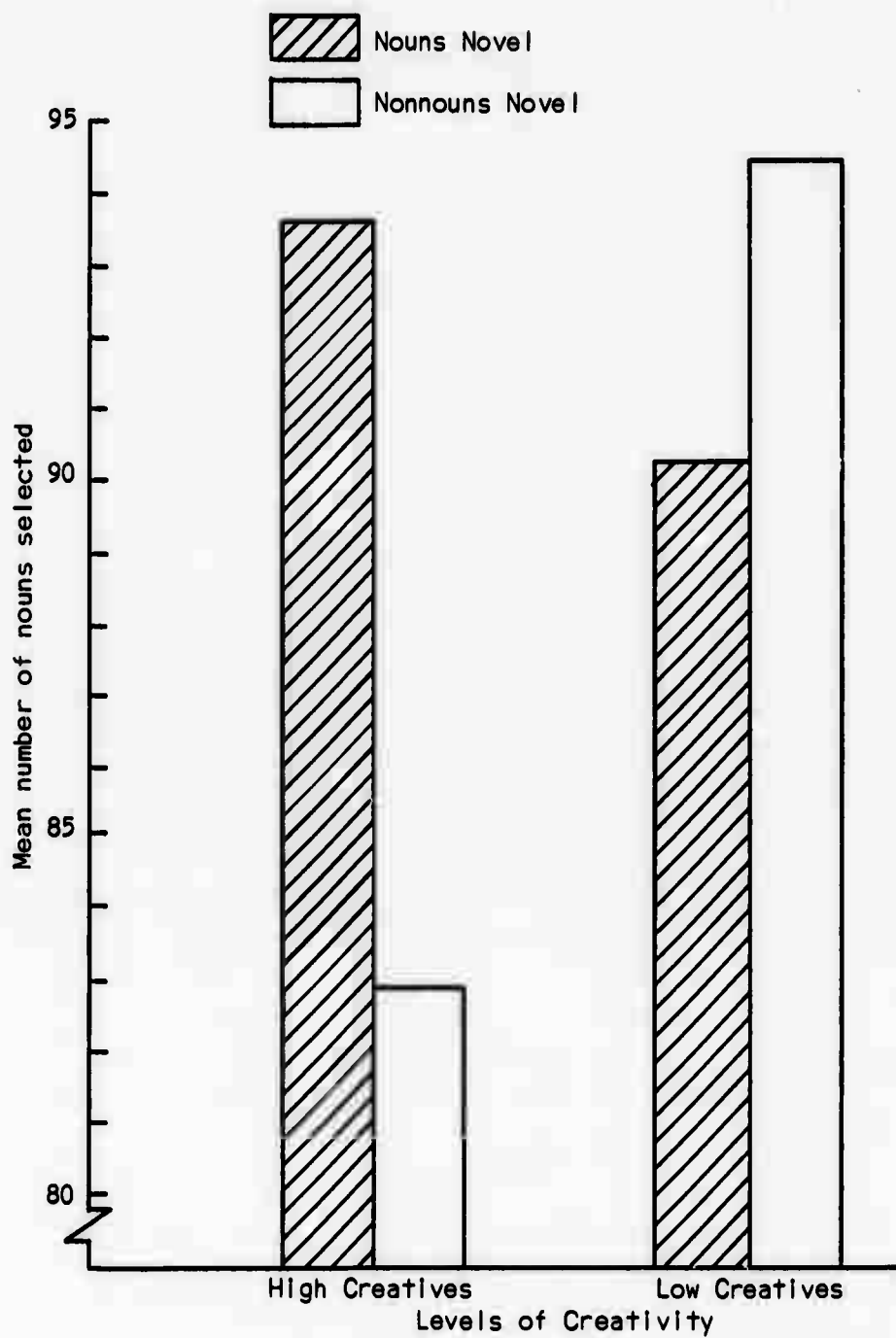


Figure 4 - Mean number of nouns selected by high- and low-creative Ss where nouns or nonnouns elicited novel responses from E.

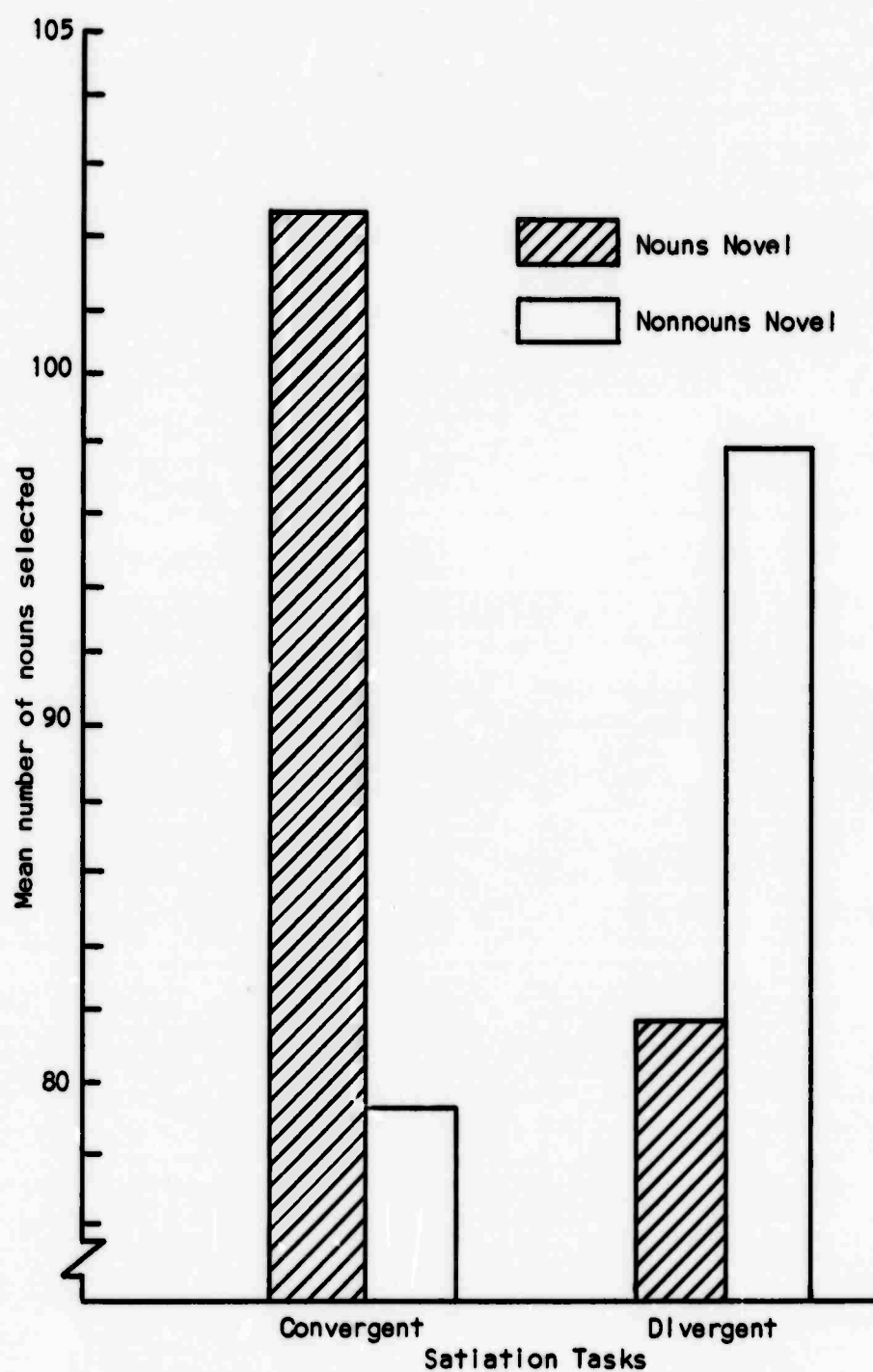


Figure 5 - Mean number of nouns selected by Ss in convergent and divergent satiation conditions and where nouns or nonnouns elicited novel responses from E.

that the difference between the "nouns" and "nonnouns" groups, when reinforced with novel associations, was greater in the convergent satiation treatment (difference = 23.1) than in the divergent satiation treatment (difference = 16.3).

In order to facilitate interpretation of the Creativity x Satiation x Word Class interaction (see the between Ss analyses summarized in Table 4) an analysis of variance for simple effects was made. The results of this analysis are summarized in Table 5. For the high-creatives, the main effects due to the Satiation treatments yielded $F(1,36) = 34.41, p < .01$, and that due to Word Class yielded $F(1,36) = 5.72, p < .05$. The Satiation x Word Class interaction yielded $F = 6.96, p < .05$. In the analysis of the data for the low-creatives, only the interaction was significant, yielding $F(1,36) = 6.22, p < .05$. The data for all groups represented in the triple interaction are presented in Table 6. The Ss in the Convergent Satiation-Nouns Novel groups and the Divergent Satiation-Nonnouns Novel groups chose nouns equally often, but for different reasons. The former groups presumably prefer nouns because they are novel, and the latter groups prefer nouns because they are common. When the Convergent Satiation-Nonnouns Novel groups are compared with the Divergent Satiation-Nouns Novel groups, it is apparent that the low-creative Ss chose not to select novel words when they were satiated with convergent thinking tasks and when nonnouns were novel. Where divergent satiation thinking tasks were employed and nouns were novel, both high- and low-creative Ss appeared to be relatively indifferent to the novel nouns, presumably because

Table 5
Summary of Separate Analyses of
Variance for Each Level of Creativity

Source	df	MS	F
High Creatives			
Satiation	1	7017.70	34.41**
Word Class	1	1666.40	5.72*
Satiation x Word Class	1	1420.00	6.96*
Error	36	203.97	
Low Creatives			
Satiation	1	664.23	3.38
Word Class	1	164.03	0.84
Satiation x Word Class	1	1221.03	6.22*
Error	36	196.39	

* $p < .05$

** $p < .01$

Table 6
Means and Standard Deviations of
Nouns Selected by Each Experimental Group

Experimental Condition	Level of Creativity				Overall Means
	High		Low		
	\bar{X}	S.D.	\bar{X}	S.D.	
Nouns					
Convergent	104.9	14.80	100.2	15.99	102.55
Divergent	82.6	11.40	81.0	7.44	81.8
Total	93.75		90.6		92.17
Nonnouns					
Convergent	65.7	9.87	93.2	6.78	79.46
Divergent	100.2	19.22	96.1	20.70	98.15
Total	82.95		94.65		88.8

they had been satiated with imaginative, flexible, and originality inducing tasks.

The analysis was further extended to compare the differences between obtained subgroup means at each level of creativity (see Table 6) utilizing the Fisher-Behrens \bar{t} -test,* the results of which were as follows: Among the high-creative groups, specifically Ss satiated with convergent thinking tasks, those who were in the nouns-novel group selected more nouns ($\bar{X} = 104.9$) than those in the nonnouns novel group ($\bar{X} = 65.7$), $\bar{t} (18) = 6.97$, $p < .001$. In a comparison of groups satiated with divergent thinking tasks, the nonnouns-novel group selected more nouns ($\bar{X} = 100.2$) than did those in the nouns-novel group ($\bar{X} = 82.6$), $\bar{t} (18) = 2.49$, $p < .05$. In the comparison between the groups which received convergent satiation with nouns-novel and that which received divergent satiation with nouns-novel, the former chose more nouns than did the latter group, $\bar{t} (18) = 3.77$, $p < .01$. Where Ss were given novel reinforcement for nonnouns, those who were in the divergent satiation group showed a greater preference for nouns than those in the convergent satiation group, $\bar{t} (18) = 5.05$, $p < .001$.

Among the low-creative groups, the differences were less dramatic; while the Ss in the nouns-novel group, when satiated with convergent thinking tasks, selected more nouns ($\bar{X} = 100.2$) than those who were in

*Selection of the Fisher-Behrens \bar{t} -test over the conventional \bar{t} -test was predicated on the existence of marked heterogeneity of variance among experimental groups. The Fisher-Behrens \bar{t} , as opposed to the conventional \bar{t} , is robust to violations of the assumption of homogeneity of variance (Kirk, 1968).

the nonnouns-novel group ($\bar{X} = 93.2$). The difference between them was not significant, $t(18) = 1.27$, $p > .05$. Comparing Ss satiated with divergent thinking tasks, the nonnouns-novel group selected more nouns ($\bar{X} = 96.1$) than the nouns-novel group ($\bar{X} = 81.0$), $t(18) = 2.17$, $p < .05$. In the comparison between Ss who received convergent satiation with nouns-novel and those who received divergent satiation with nouns-novel, the former group chose more nouns than did the latter group, yielding $t(18) = 3.44$, $p < .01$. Where Ss were given novel reinforcement for nonnouns, there was no significant difference between those in the convergent and divergent satiation conditions. An analysis of these data yielded $t(18) = 0.42$, $p > .05$.

The results of the above comparisons clearly imply the important influence of word class reinforcement on the selection of words by high-creative Ss. The optimal condition for arousing a preference for novel associations was convergent satiation in combination with nouns eliciting the novel responses. The combination which produced the least influence on receptivity to novel associations as reinforcing stimuli was satiation on divergent thinking tasks with nonnouns eliciting the novel responses. For the low-creative Ss the results are somewhat more ambiguous. It is clear that where nouns elicit novel responses, Ss satiated with convergent thinking tasks manifest a greater need for novelty than those who are satiated with divergent tasks. But no greater need for novelty was shown between the two satiation conditions when nonnouns elicited novel responses. Concerning the effect of type of word class reinforcement, it appears

to be an unimportant factor in the need for novelty for Ss in the convergent satiation condition. However, for Ss in the divergent satiation condition, the inferred need for novelty was greatly increased when novel associations were given to nouns.

CHAPTER V

DISCUSSION

The results of this investigation provide substantial support for the notion that the inferred need for novelty is related to the antecedent conditions which precede the measurement of this need. When Ss are satiated with convergent thinking tasks they seek divergent conditions and conversely, when satiated with divergent thinking tasks they seek convergent conditions. This process appears to be very much like the adaptation level (AL) theory proposed by Helson (1966). It can be inferred from Helson that if a learning activity is repeated, pupils adapt to it and become indifferent to it. Eventually, with undue repetition, people will dislike this activity so much, they will attempt to avoid it. Thus, Helson (1966, p. 178) indicates:

In explaining why people behave as they do or what makes them tick - It may be asked: "How do you explain persistence toward future goals and accomplishments? What keeps individuals on a constant course toward certain ends, such as becoming a doctor, a lawyer, or a psychologist?" Predominant ideas serve as inciters to courses of action over extended periods of time. There are emotional and intellectual frames of reference as well as perceptual frames of reference, and they are found in much the same way. Just as background anchor, or predominant stimuli exercise influence on sensory ALs, so do predominant ideas and emotions exercise influence on ideational and emotional frames of reference Individuals do better with difficult items of intelligence tests in a difficult context than in an easy one because of

the upward adaptation to level of difficulty induced by the preponderance of harder items, thus, proving the existence of cognitive ALs.

It is, then, the relative nature of the two states of the S, rather than absolute characteristics that are important in the motivations of human Ss. This interpretation differs somewhat from the conclusion reached by Houston and Mednick (1963). On the basis of the present results, it does not appear that high-creatives necessarily possess a greater need for novelty than low-creatives as suggested by Houston and Mednick (1963). In fact, the differences between the need for novelty of high- and low-creatives in the same treatment groups were exceedingly small. The most important factor in arousing the need for novelty was found to be the satiation treatment.

This is not to imply that the level of creativity was an unimportant consideration in this study. Personality variables are certain to interact with the peculiar circumstances of each experimental situation as they did in the present study. This reasoning is analogous to that employed by Taylor (1956) in her description of the role of anxiety, as measured by the Manifest Anxiety Scale (MAS), in the behavior of the individual. Taylor, in describing the MAS, states two alternative hypotheses concerning the conditions under which emotionality is evoked by Ss. The first hypothesis is that MAS test scores reflect differences in a chronic emotional state so that individuals scoring high on the MAS tend to bring a higher level of emotionality or anxiety "in the door" with them than do Ss scoring at lower levels. The alternative hypothesis suggested by Taylor is that

MAS scores reflect different potentialities for anxiety arousal, with high-scoring Ss tending to react more emotionally to novel or threatening situations than do low scoring Ss.

These two alternative hypotheses are somewhat analogous to the present interpretation of the RAT as a measure of creativity. On the one hand, it may be hypothesized that the RAT reflects trait differences; that is, Ss scoring high on the RAT are more creative than Ss scoring low. Conversely, it can be hypothesized that high RAT scores indicate predispositions to respond creatively to certain stimulation while low scores indicate lesser predispositions to respond to novel stimulation. There are, then, two interpretations of the RAT: it can be thought of as a measure of the personality trait of creativity, or it can be thought of as the tendency to respond, or not to respond, creatively in certain situations. The present study appeared to tap the latter tendency, in that the effects of the satiation conditions (situational factors) were more important determiners of creative preference than the classification of Ss as high- or low-creatives based on their RAT scores (trait factors).

The results of this study also require that some explanation be given for the fact that the learning curves (see Figures 1 and 2) do not illustrate any significant increase in the number of nouns or nonnouns selected over trials, although Ss did, in fact, tend to select significantly more or fewer words associated with novel responses, as indicated by their total scores. The explanation for this case, where Ss actually did exhibit a preference for certain word

types in order to augment or decrease their novel stimulation, can be attributed as an example of learning without awareness as described more than three decades ago by Thorndike who contended that rewards and punishments can influence the formation of stimulus-response connections, even while the S remains unaware of what it is he is learning. Postman (1966) cites a study by Thorndike and Rock (1935) which focused on learning free associations without awareness. A series of 320 words were read to Ss, and they were instructed to respond with the first association that came to mind. The Ss were previously told that associations had been arbitrarily designated as either "right" or "wrong." In actuality, the announcement of "right" and "wrong" was made according to a rule: sequential or rote associations were called "right," and denotative associations were called "wrong." In cases where S's association was not easily classified, no announcement was made by E. The results of this study revealed that there was a gradual increase in the number of "right" associations, i.e., Ss learned to give the class of associations for which they were rewarded. From the fact that the improvement was gradual, Thorndike and Rock concluded that the Ss had not been aware of what they were learning. The concept of learning without awareness seems to be an appropriate explanation for the present study. Had there been insight into the principle of novel associations, a sudden increase in correct responses would have occurred. Instead, gradual improvement was the rule.

Before proceeding any further in the discussion, it is necessary to distinguish between the preference for novelty and the actual performance resulting from novel behavior, when reference is made to the need for novelty. Throughout this report, the need for novelty has been equated with the number of words selected (either nouns or nonnouns, depending on which class elicited novel associations) in the experimental task. This, in itself, manifests the degree to which Ss preferred novel responses. The question which remains to be answered is this, "is novel performance, or the tangible products of behavior, stimulated by the manipulation of various antecedent conditions?" For example, if an instructor desired the production of creative stories by his learners, he would satiate them, according to the theories discussed previously, with convergent thinking tasks. If it is assumed that the preference for novelty is augmented, can it still be argued that the stories produced will reflect a high level of novelty? The present investigator believes that novelty of performance will also be increased. This belief is grounded on Helson's adaptation level theory and Hull's notion of reactive inhibition, both of which were discussed earlier.

Turning to the practical applications of the study it is concluded that the basic implications from this study for use in instructional settings are twofold:

- (1) A need for novelty can be aroused in any learner, whether a high or low creative person, by adequate control of the antecedent conditions. Conversely, the need for novelty may be hampered or the need for normative behavior encouraged by overexercise on tasks requiring creative effort.

- (2) Moderate emphasis on creativity ought to be adopted by those actively involved in the instructional process, since any attempt to satiate learners with creative stimulation will only serve to decrease the need for novelty.

These implications will be scrutinized and evaluated below in the light of the present research and other relevant considerations in the study of creativity.

It is apparent from the results that during the satiation treatment preferences for novelty are either increased or decreased depending on the type of satiation. Under convergent satiation, Ss become excessively bored with the monotonous stimulation which they are provided. Such tasks as inserting plastic tiles into pegboards to form rectangles and solving simple crossword puzzles where the answer is common knowledge, do not tend to keep motivation or attention at a high level. An escape from the banality of the tasks used for satiation of convergent thinking is the opportunity to select words which will elicit unusual or novel responses from E. The E's responses, as stimuli which follow S's responses, are, presumably, highly reinforcing to the S who has been exposed to convergent satiation tasks for over half an hour. Conversely, the S who has been performing in a situation where he is virtually being forced to produce imaginative, unusual, and hypothetical responses will seek to avoid this cognitively taxing situation, even if only temporarily, and will desire to return to the common everyday realities. He will tend to avoid selecting words which lead to the evocation of novel responses by E, i.e., he will tend to select words followed by common associates as reinforcing stimuli.

What is so convincing about this type of behavior is that it was characteristic of high- as well as low-creative Ss. This finding underscores the fact that novel stimuli lose their unique attributes when presented to S to the point of satiation, regardless of the personality characteristics of S. Referring now to the two implications stated previously, instructors are admonished that overzealous techniques to develop creative thinking in learners may be self-defeating.

With regard to the first implication, a question that must be answered is whether creativity was adequately measured by administering the Remote Associates Test. Jackson and Messick (1964) are among many psychologists who sharply reject the value of the RAT, arguing that this test might be measuring intelligence. According to Jackson and Messick (1964, p. 311):

In this test the S is presented with three words, such as "rat," "blue," and "cottage," and is required to supply a fourth word to serve as a kind of associational link between the other three stimulus words. For the example given the answer is "cheese." Now it is argued that this answer reflects a degree of creativity because it is "remote" and "useful," at least in the sense of meeting specified requirements. We would insist that the answer reflect an aspect of intelligence because it is correct.

Since there are no other answers keyed to the items on the RAT, it may not be an effective measure of divergent thinking. The problem of adequately defining creativity in an operational manner that is widely acceptable is a critical one but it is beyond the scope of the present study. Thus, the present results are limited to the conclusion that,

If the RAT is employed as a measure of creativity, there are no inherent differences between high and low creatives concerning the need for novelty.

The second implication regarding the instructor's role in nurturing creative potential is also subject to careful examination and criticism. It is clear that in most situations very few instructors come even close to satiating their students with divergent thinking activities. Getzel and Jackson (1962) and Torrance (1963) offer sizeable evidence to show that teachers not only dislike the creative student but they also refrain from teaching in a creative and flexible manner. Many teachers persist in teaching for convergent thinking, that is, they seek the correct answer, the proper method or principle, or the normative behavior from the students and reward such behavior to the exclusion of divergent behaviors. Departures from expected norms of classroom performance and behavior are frowned upon and the potential for originality that a student may have is, more often than not, stifled. The discouragement of creativity by teachers according to some authors (e.g. Kozol, 1967) is especially prevalent in schools for the culturally disadvantaged. Middle class white teachers, shocked by the cultural and cognitive systems of a different ethnic group, often times openly resent the novel expressions of cultural identity of their students. Kozol (1967, p. 179) in describing the list of character traits to be developed in the Boston Public Schools commented:

You look in vain through this list for anything that has to do with an original child or with an independent style. You look also in vain for any evaluation or assessment or conception of the human personality as a full or organic or continuously living and evolving firmament rather than as a filing cabinet of acceptable traits.

But it may not be solely a matter of fully satiating students on one kind of activity or another. Rather, the implication of this study is that the relative contrast of two conditions is important.

Despite these numerous instances where creativity is being thwarted, the more progressive of contemporary educators has advocated the policy of nurturing creative activity as one of the primary objectives in instructional activity. Goodman (1964) contends that a few educators have overemphasized the notion that creative learning is the best learning. He is highly critical of Bruner's (1960) notions in The Process of Education which (1) counsels practical "learning by doing," (b) encourages an inordinate amount of guesswork and fantasy, and (c) suggests that there is no point in learning answers, for very soon there will be different answers. Although Goodman does not explicitly suggest a superabundance of creativity to decrease a student's need for novelty, he contends that the methods proposed by Bruner will so burden the learner with discovery work that "discovery will be greeted not by a cheer but by a razz." Thus, it is evident that satiation with creative methods may not be the "great leap forward" that many progressives believe it to be.

Contrary to the arguments of Goodman, there is some evidence to support the idea that the desire for novelty might not be impaired by excessive exposure to creative tasks. Flanagan (1967), matched pairs

of undergraduates on Form 1 of the Remote Associates Test and assigned each member of a pair to one of two groups. In the experimental group, the Ss worked at a highly creative task for a one hour period (the Test of Original and Creative Thinking [TOCT]). The control group worked for an hour on a noncreative task, which involved naming the 50 states and their capitals. The results indicated that the experimental group performed significantly better ($p < .01$) on Form 2 of the RAT which was given after the interpolated activity. Apparently, practice in the creative tasks did not impair the ability of Ss to be creative. This result does not refute the findings of the present study, for the satiation with convergent tasks in the Flanagan study would probably impair performance on the RAT, but it would not necessarily reduce the need for novelty among Ss in the control group. Melchert (1967) theorized that exposure to novel stimulation would arouse the perceptual curiosity of children in a subsequent task. He divided a class of fifth grade children into three groups. One group was shown a high-novelty movie, the second group an average-novelty movie, and the third group was shown a low-novelty movie. All Ss were then given a tachistoscopic viewing task, which consisted of light colored slides and which were exposed at 0.2 seconds each. Some of the slides were complex and novel, while others were common and unoriginal. The Ss were instructed that they could view the slides as many times as they preferred. The results of the study showed that there were no significant differences between the three experimental groups on the amount of time spent looking at the complex slides. Thus, the novel

film did not produce any notable preference for novel stimulation. Such studies must be viewed with skepticism, however, since the definitions of novelty by the adult E and the child Ss may not be congruent.

Although the work of Berlyne (1950) and Maddi (1965) suggest strong psychological support for the theory that satiation in novelty produces avoidance behavior, the literature applying these principles to the educational milieu is scant. It does appear that there is a curvilinear relationship between the amount of divergent thinking which a learner is exposed to and his subsequent desire for novelty. It is suggested that more research is needed in an attempt to delineate the quantitative (levels) and qualitative characteristics of divergent thinking that serve to sustain the need for novelty for optimal periods of time. If such research as the present is to find utility in instructional strategies other studies will be required which attempt to satiate Ss with convergent and divergent thinking over longer periods of time. This investigator does not intend to question the generalizability of the present study merely because the satiation lasted for 30 minutes, for 30 minutes might be sufficient time in a class period to effect performance of a pupil in school for the whole of the next period. However, it does appear evident that satiation or deprivation of divergent thinking for extended periods of time might be a fruitful endeavor, at least on an exploratory basis. In further research it would appear that a quasi-naturalistic study comparing the subsequent preference for novel stimulation of students who are taught

by a convergently oriented teacher could provide useful supplementary data. This type of experiment could best be undertaken in an elementary school, where one teacher is with the same learners all day long.

The investigation of the effects of both brainstorming and synectics on the need for novelty of learners would also appear to be a fruitful area for further investigations to extend the present one. Brainstorming, which is the uninhibited outpouring of ideas without evaluation, and synectics, which is the joining together of different and apparently irrelevant elements, are both procedures which could be artificially introduced to the classroom situation and manipulated to varying degrees (Barron, 1969). The effects of need for novelty on these processes as well as the effect of engaging in these activities on later need for novelty would appear to be especially relevant investigations for instruction.

Recognizing that the present study employs an aptitude X treatment interaction (ATI) orientation, this type of research could be instrumental in ascertaining the effect of convergent or divergent satiation upon high and low IQ groups, for example. Perhaps different aptitude groups might develop a need for novelty under certain types of satiation. In this sense, it may be found that the results of the present study apply to differences in intellectual ability (i.e., that the RAT measures intelligence) rather than "creativity." Further investigations are thereby suggested in which these two constructs are separated more precisely than in the present study. Closely related to

this type of research, and of equal value, would be a study of the effect of these satiation conditions upon the need for novelty of learners in various socioeconomic and ethnic groups. Such a study might reveal the proper use of satiation procedures as a motivating device, particularly for culturally disadvantaged learners.

In summary then, the results of this study bring to light a variety of suggestions for the development and maintenance of a need for novelty. As a general rule, satiation of subjects with divergent thinking experiences has an undermining effect on their need for novelty. Refinements in the measurement techniques and extension of the results to specific problem areas in learning, will hopefully result in an augmentation of the value of this investigation.

CHAPTER VI

SUMMARY

Previous experiments have shown that high-creative individuals possess a strong need for novelty. High-creatives prefer to experience the uniqueness and complexity of their perceptual environment. They also seek out original and individualized ways of dealing with people, places and things. It has been found that satisfying the need for novelty for high-creatives is reinforcing, and that the probability of emitting the behavior which immediately preceded the reinforcement is thus increased.

Several experiments have illustrated that when Ss are satiated with novel stimuli, that they lose their curiosity drive and that their exploratory behavior is minimal. Also, novel responses when presented too frequently lose their novelty. In Hullian terms, this phenomenon is explained as an example of reactive inhibition, where avoidance behavior is manifest due to the boredom caused by repeated exposure to the same stimuli. It was reasoned that if an S was satiated with novel thinking experiences, he would probably tend to display a very low need for novelty. If an S were deprived of novel stimulation, his need for novelty might be aroused to escape the boredom of his lack of

novelty. If novel stimulation can be equated with divergent thinking and nonnovel stimulation can be equated with convergent thinking, it can then be hypothesized that satiation with divergent thinking tasks will produce a weak need for novelty, while satiation with convergent thinking tasks will have the opposite effect.

In this experiment, high- and low-creative Ss were divided into divergent satiation and convergent satiation treatment groups. The divergent satiation groups were given a series of creative, imaginative, and flexible tasks, while the convergent satiation groups were given a series of highly structured, common simple tasks, that called for one and only one appropriate response. Following the satiation condition, each Ss inferred need for novelty was measured. Ss were shown 180 slides. On each of 160 slides was a pair of words, a noun and a nonnoun. For half of the high- and low-creatives, when a noun was selected, the E responded verbally with a novel association of that noun. When a nonnoun was selected by S, the E responded with a common association. For the other half of the Ss the procedure was reversed, with nouns eliciting common responses, and nonnouns eliciting novel responses. The remaining 20 slides were filler items used to prevent S from gaining insight into E's intent. It was predicted that high-creatives satiated with convergent thinking tasks would show a stronger need for novelty than high-creatives satiated with divergent thinking. The same predictions were made for low-creatives, but to a lesser degree, since low-creatives have a lower need for novelty than high-creatives. The results confirmed both of these predictions. The

creativity variable proved to be an unimportant factor in determining the strength of S's preference for novelty. Thus, the antecedent conditions prior to measuring the inferred need for novelty are important components to be considered, if creative potential is to be nurtured. The results also suggest the possibility that excessive use of techniques to promote divergent thinking may be a self-defeating instructional strategy.

BIBLIOGRAPHY

- Angier, R. The aesthetics of unequal division. Psychological Review, 1903, 48, 541-561.
- Barron, F. The psychology of imagination. Scientific American, 1958, 199, 150-166.
- Barron, F. The needs for order and for disorder as motives in creative activity. In C. W. Taylor and F. Barron (Eds.), Scientific creativity: its recognition and development. New York: John Wiley, 1963, pp. 153-160.
- Barron, F. Creative person and creative process. New York: Holt, Rinehart, and Winston, 1969.
- Berlyne, D. Novelty and curiosity as determinants of exploratory behavior. British Journal of Psychology, 1950, 41, 68-80.
- Berlyne, D. Conflict, arousal, and curiosity. New York: McGraw-Hill, 1960.
- Bruner, J. The process of education. Cambridge: Harvard University Press, 1960.
- Cofer, C. and Shevitz, R. Word association as a function of word frequency. American Journal of Psychology, 1952, 65, 75-79.
- Flanagan, M. and Gallup, H. Creativity training. Psychological Reports, 1967, 21, 934.
- Gallagher, J. Research summary on gifted child education. State of Illinois Department of Program Development for Gifted Children, 1966.
- Gerow, J. and Pollio, H. Word association, frequency of occurrence, and semantic differential norms for 360 stimulus words. Technical Report No. 1, 1965, University of Tennessee.
- Getzels, J. and Jackson, P. Creativity and intelligence. New York: John Wiley, 1962.

- Golann, S. F. The creativity motive. Journal of Personality, 1962, 30, 588-600.
- Golovin, N. The creative person in science. In C. W. Taylor and F. Barron (Eds.), Scientific creativity: its recognition and development. New York: John Wiley, 1963. Pp. 7-23.
- Goodman, P. Compulsory mis-education. New York: Vintage Books, 1964.
- Guilford, J. Three faces of intellect. American Psychologist, 1959, 14, 469-479.
- Guilford, J. and Merrifield, P. The structure of intellect model: its uses and implications, Reports from Psychological Laboratory, No. 24, University of Southern California, 1960.
- Helson, H. Some problems in motivation from the point of view of the theory of adaptation level. In D. Levine (Ed.), Nebraska symposium on motivation. Lincoln, Neb.: University of Nebraska, 1966.
- Houston, J. and Mednick, S. Creativity and the need for novelty. Journal of Abnormal and Social Psychology, 1963, 66, 137-141.
- Hull, C. Principles of behavior. New York: Appleton-Century-Crofts, 1943.
- Jackson, P. and Messick, S. The person, the product, and the response: conceptual problems in the assessment of creativity. Journal of Personality, 1965, 33, 309-329.
- Kirk, R. Experimental design: Procedures for the behavioral sciences. Belmont, Cal.: Wadsworth, 1968.
- Kozol, J. Death at an early age. Boston: Houghton Mifflin, 1967.
- Lambert, W. Associational fluency as a function of stimulus abstractness. Canadian Journal of Psychology, 1955, 9, 103-106.
- Maddi, S. Unexpectedness, affective tone, and behavior. In D. W. Fiske and S. Maddi (Eds.), Functions of varied experience. Homewood, Ill.: Dorsey Press, 1961. Pp. 380-401.
- Maddi, S. Motivational aspects of creativity. Journal of Personality, 1965, 33, 330-347.
- Maddi, S., Charlens, A., Maddi, D. and Smith, A. Effects of monotony and novelty on imaginative productions. Journal of Personality, 1962, 30, 513-529.

- McClelland, D. The use of measures of human motivation in the study of society. In J. W. Atkinson (Ed.), Motives in fantasy, action, and society. Princeton, N.J.: Van Nostrand, 1958. Pp. 518-552.
- McClelland, D., Atkinson, J., Clark, R. and Lowell, E. The achievement motive. New York: Appleton-Century-Crofts, 1953.
- McDougall, W. An introduction to social psychology. London: Methuen, 1908.
- Mednick, S. The associative basis of the creative process. Psychological Review, 1962, 69, 220-232.
- Mednick, S. and Mednick, S. Examiner's manual: remote associates test. Boston: Houghton Mifflin, 1967.
- Mednick, M., Mednick, S. and Jung, C. Continual association as a function of level of creativity and type of verbal stimulus. Journal of Abnormal and Social Psychology, 1964, 69, 511-515.
- Melchert, J. Novelty and change in the perceptual curiosity of children. Unpublished doctoral dissertation. Northwestern University, 1967.
- Palermo, D. and Jenkins, J. Word association norms grade school through college. Minneapolis: University of Minnesota Press, 1964.
- Platt, J. Beauty: pattern and change. In D. Fiske and S. Maddi (Eds.), Functions of varied experience. Homewood, Ill.: Dorsey Press, 1961. Pp. 402-430.
- Postman, L. Psychology in the making. New York: Alfred A. Knopf, 1966.
- Stein, M. and Heinze, S. Creativity and the individual. Glencoe, Ill.: Free Press, 1960.
- Taylor, C. and Barron, F. (Eds.). Scientific creativity: its recognition and development. New York: John Wiley, 1963.
- Taylor, J. Drive theory and manifest anxiety. Psychological Bulletin, 1956, 53, 303-320.
- Torrance, E. The creative personality and the ideal pupil. Teachers College Record, 1963, 65, 220-226.

Welker, W. An analysis of exploratory and play behavior in animals.
In D. W. Fiske and S. Maddi (Eds.), Functions of varied experience.
Homewood, ill.: Dorsey Press, 1961. Pp. 175-226.

White, R. Motivation reconsidered: the concept of competence. In
D. W. Fiske and S. Maddi (Eds.), Functions of varied experience.
Homewood, ill.: Dorsey Press, 1961. Pp. 278-325.

APPENDICES

APPENDIX A
SATIATION OF DIVERGENT THINKING TASKS

Crossword Puzzle

Directions: Construct your own crossword puzzle using words for both down and across positions. Feel free to make use of blank squares to separate words or to fill in unnecessary spaces. Be sure to number your squares when you are through. Be as imaginative as possible in your choice of words. Please fill in the correct answers when you have completed the puzzle.

ACROSS

DOWN

Construction Task

Directions: You are to create an imaginative design using any color and shape of plastic tile that you possess. You should strive to produce a design that no one else would ever think of making. You may fill in any area of the pegboard that you wish.

Suffixes Test

Directions: Write as many words as you can ending with the suffix
ABLE.

Example: likable

[illegible]

Consequences Test

Directions: List many different results that would be associated with the following new and unusual situation. Be as imaginative as possible.

What would the results be if people no longer needed or wanted sleep?

Utility Test

Directions: List as many different uses of a brick that you can think of. Be as imaginative as possible.

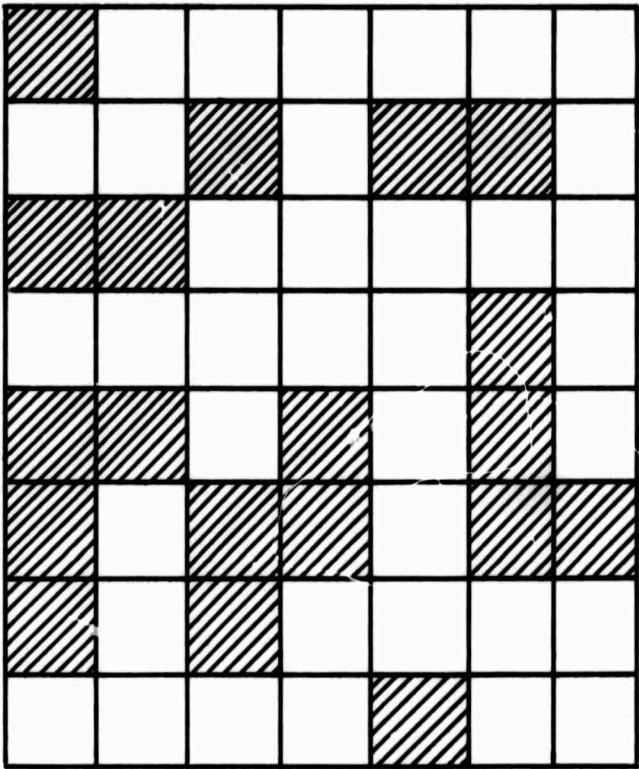
Now list as many different uses of a pencil that you can think of. Once again be as imaginative as possible.

APPENDIX B
SATIATION OF CONVERGENT THINKING TASKS
Crossword Puzzle

Directions: Solve this crossword puzzle as accurately as possible.
There is only one correct letter for each empty space.

Across

- 1. Vice-president of United States
- 6. Abbreviation of Pennsylvania
- 10. Short for Edward
- 13. Fruit used to make jelly
- 18. Certain
- 22. Abbreviation of Kentucky
- 25. Organization of American States (Abbreviation)
- 29. American League (Abbreviation)
- 32. Opposite of near

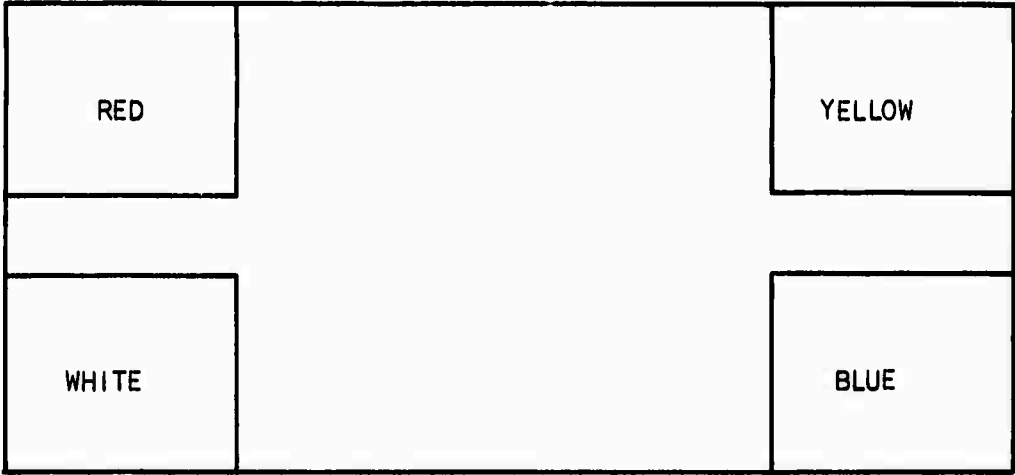


Down

- 1. State where eskimos live
- 3. ___ slave
- 6. Sneaking a look
- 7. Short for advertisement
- 14. He ___ his book
- 23. New ___ City
- 30. Los Angeles (Abbreviation)

Construction Task

Directions: You are to fill in the designated areas of the empty pegboard with the appropriate colored plastic tiles to form four different colored rectangles. All tiles must be placed horizontally on the pegboard. All tiles of each color must be used.



Sentence Order Test

Directions: Arrange the following sets of three sentences in a meaningful order.

Example:

- 3 The airplane lifted off the ground.
1 The passengers boarded the airplane.
2 The passengers were seated in the airplane.

1. ☐ She bought some food at the market.
☐ She returned home and cooked some of the food she had bought.
☐ She went to the market.
2. ☐ The pitcher threw the ball.
☐ The batter hit the ball.
☐ The baseball game began.
3. ☐ The leaves changed in color.
☐ The winter snows began.
☐ The leaves fell.
4. ☐ The sun set over the mountains.
☐ The hot sun beat down on the travellers.
☐ The sun rose slowly over the horizon.
5. ☐ The temperature dropped sharply.
☐ The water was placed in the pan.
☐ The ice in the pan was thick.
6. ☐ The boy finished his homework.
☐ The boy read his assignment.
☐ The boy opened his textbook.
7. ☐ The man woke up at 7 a.m.
☐ The man was late for work.
☐ The man ate breakfast.
8. ☐ A new home was built in the city.
☐ A highway was constructed where the new home once stood.
☐ The new home was torn down.

9. ☐ The gunman handed the bank teller a note.
☐ The gunman entered the bank.
☐ The gunman ran from the bank.
10. ☐ The robin built its nest.
☐ The eggs were hatched.
☐ The young robins learned to fly.

Word-Group Naming Test

Directions: Give a class name to each of the following groups of five words.

Example:

knife pan bowl rolling pin strainer
cooking utensils

1. tornado hurricane flood typhoon drought

2. pen pencil blotter envelopes paper

3. tires engine windshield brakes steering wheel

4. apples oranges pears grapes plums

5. tennis racket football baseball glove bat ice skates

6. ham steak liver veal pork

7. fish horse eagle dog snake

8. hammer chisel screwdriver pliers saw

9. cottage apartment castle trailer cabin

10. train airplane car bus ship

APPENDIX C

WORD LIST

Slide	Nouns		Nonnouns	
		Elicit Novel Response	Elicit Novel Response	
1.	bring trunk	take hips	song tree	
2.	sheep white	lame black	lamb tie	
3.	broken trees	arm love	jar green	
4.	trouble bristly	family brush	bad pine	
5.	flea scalding	joke hot	dog harm	
6.	thirsty brother	water nice	turn sister	
7.	earth playing	river working	dirt poker	
8.	hand sour	something sweet	foot stale	
9.	sickness village	health town	health town	
10.	winter adorned	round decorated	cold praised	
11.	frosty python	cold grace	smoky snake	
12.	clearer comfort	fuzzy miserable	steer chair	
13.	red whiskey	yellow key	beautiful drink	

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
14. silk even	ear	odd	smooth	six
15. shiny farm	bright	acreage	flowing	house
16. people over	apple	under	crowd	more
17. quiet street	loud	noisy	person	road
18. snail stove	slow	hot	slow	hot
19. appear cheese	see	water	where	mouse
20. telephone now	bell	then	call	will
21. tornado clean	louse	dirty	storm	good
22. charming time	baby	newspaper	cold	clock
23. sunlight complete	night	finish	bright	over
24. soldier intermittent	iron	between	man	rate
25. puppies glaring	helpless	bright	dogs	dark
26. clumsy thief	awkward	nut	lazy	steal
27. justice bible	law	book	law	book
28. king blue	lord	sky	queen	house

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
29. memory smooth		person rough	mind short	
30. foot salty		part sweet	show strong	
31. quickly priest		fast worship	car church	
32. always fruit		never goodies	done apple	
33. town calm		west lake	city nervous	
34. bath beautiful		good ugly	clean adorable	
35. sister elegant		adore beautiful	brother skinny	
36. boulder base		rock ball	rock ball	
37. lagging mother		behind glasses	beer father	
38. scientist feverish		worthy hot	Einstein sweat	
39. leisurely money		time matter	cool green	
40. mosquito late		thing early	bit sorry	
41. wagon brave		tongue strong	wheels football	
42. anger afraid		heaven fear	hate country	
43. bleak war		house roses	weak peace	

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
44. stout devil		fat smart		sound Satan
45. month stork		day baby		day baby
46. divorce steal		horrid take		marriage cow
47. tobacco soft		food hard		smoke ball
48. doors rough		wide smooth		windows walk
49. boy therefore		him because		girl good
50. dough stagnant		boys water		bread gin
51. sit citizen		down tax		couch man
52. city short		mile tall		town gun
53. lion bitter		rough sweet		tiger sea
54. candy barn		sweet yard		sweet yard
55. stem green		smoke grass		flower lake
56. however butter		but bum		be bread
57. yellow window		color washer		duck glass
58. luscious lizard		good boy		great snake

Slide	Nouns		Nonnouns
	Elicit	Novel Response	Elicit Novel Response
59. round food		square destruction	sharp eat
60. mild leper		soft sad	dove disease
61. lemon narrow		draw wide	sour close
62. jump religion		high cousin	track God
63. hammer bird		nail fly	nail fly
64. severe feather		hard kind	nerve bird
65. obscure leadership		dim rank	might president
66. woman younger		work older	man one
67. hot nail		cold scar	hurt hammer
68. become bed		became morning	career sleep
69. obvious lake		easy butter	wrong water
70. mold lenient		change easy	bread bad
71. doctor closer		witch nearer	nurse see
72. fingers art		hand beauty	hand beauty
73. lady overcast		prim cloudy	woman glow

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
74. dream have		play not	sleep toys	
75. wise house		smart lawn	stable home	
76. criminal sweeping		derelict broom	bad all	
77. speak spider		talk shoe	eat web	
78. kitchen pungent		spotless odor	sink fresh	
79. income radiant		status light	money rock	
80. music inferior		string superior	song bashful	
81. cabbage arches		vegetable back	vegetable back	
82. find bread		lose cut	your butter	
83. loveable millionaire		girl hope	odd money	
84. graceful pigment		swan creamy	snob color	
85. piano gradual		pretty slow	music school	
86. flaming root		fire hold	bush tree	
87. gloomy progress		dark limb	wet forward	
88. color ugly		vivid pretty	blue gray	

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
89. indifferent whistle		careless fun		slly sound
90. hit ink		ball pen		ball pen
91. under coal		over organic		door black
92. agile web		quick school		belong spider
93. tall courage		short free		straighl brave
94. mind lofty		none high		brain bowling
95. head faster		fat slower		hair Christmas
96. sweet chair		sour setting		work table
97. maliet luminous		gun bright		hammer bug
98. truth brilliant		tooth bright		lie day
99. dirt scissors		mud cut		mud cut
100. flower rugged		smile strong		rose tender
101. sudden cushion		quick protect,		change soft
102. hardly moon		ever shiny		faint star
103. shoes thinner		cloth fatter		foot bread

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
104.	stars curved	objects road	sky arm	
105.	starving danger	hungry sighting	pain fear	
106.	lift minister	raise bore	tote preacher	
107.	socialism deformed	money crippled	communism mutation	
108.	butterfly America	moth country	moth country	
109.	father shady	sorrow tree	mother rest	
110.	think controversy	mind side	must argument	
111.	happy pig	sad hairy	today hog	
112.	liquor mad	fine angry	drink good	
113.	delayed snow	reaction slick	clock white	
114.	spicy effort	cake just	gum try	
115.	deep song	shallow note	loft sing	
116.	dawn study	sleep book	morning match	
117.	egg cow	chicken milk	chicken milk	
118.	God relaxed	nonsense tense	religion Saturday	

	Slide	Nouns		Nonnouns	
		Elicit	Novel Response	Elicit	Novel Response
119.	stench crude		nothing rough	smell nasty	
120.	cop tense		poor nervous	police time	
121.	stiff discomfort		board tension	still pain	
122.	leg nice		share good	arm fake	
123.	health heavy		run light	sickness smoker	
124.	long needle		short nail	shout thread	
125.	cottage all		age buy	house away	
126.	politician cat		Johnson dog	Johnson dog	
127.	easier girl		harder her	math boy	
128.	rose firm		wonderful hard	red angry	
129.	coiled sword		snake draw	wind knife	
130.	fiery scene		flame fuss	fog picture	
131.	rich glove		poor need	furs hand	
132.	black cars		white machine	scarf trucks	
133.	pliable knife		soft flash	pry cut	

	Slide	Nouns	Nonnouns
		Elicit Novel Response	Elicit Novel Response
134.	crooked stove	straight league	slick hot
135.	blossom rust	flowers metal	flowers metal
136.	success continuous	height constant	money ring
137.	constant Sunday	always bad	true church
138.	symphony coarse	pity rough	music way
139.	only guns	one shout	something shoot
140.	pain high	sorry low	hurt toll
141.	swift table	fast book	good chair
142.	heartless patriot	cruel why	dead country
143.	abrupt youngster	quick lucky	curvy child
144.	numbers cabinet	letters desk	letters desk
145.	lamp drop	road glass	light letter
146.	stomach slowly	bad fast	food movement
147.	live kittens	die it	man cats
148.	somber faith	sleep whale	older religion

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
149. mountain hungry	low	food	hill	cow
150. elevated sin	high	dumb	alone	bad
151. water bad	can	good	drink	fun
152. home rapid	heart	fast	house	boat
153. mutton frog	lamb	toad	lamb	toad
154. fragrant rage	smell	subtle	nice	mad
155. quota frightful	none	scared	number	sorrow
156. edged slack	sharp	give	away	give
157. family small	traits	large	love	pin
158. refined grief	cultured	fear	policy	sorrow
159. peace hasty	truth	fast	war	retreat
160. make man	do	cute	fashion	woman
161. fire scorching	glowing	hot	hot	ruin
162. dogs voyage	cats	trip	cats	trip
163. rancid hospital	odor	big	dry	sick
164. child loud	nephew	soft	baby	high

Slide	Nouns		Nonnouns	
	Elicit	Novel Response	Elicit	Novel Response
165.	curled statue	hair poise	warm (of) Liberty	
166.	cold eagle	hot nice	bed bird	
167.	ocean hotter	wavy colder	water food	
168.	putrid jelly	smell mix	scene jam	
169.	foreigner ripe	away fruit	stranger raw	
170.	Negro holy	individual biblie	Black people	
171.	children army	kids navy	kids navy	
172.	engine sparkling	steam water	motor gin	
173.	bright vision	light misty	sharp see	
174.	slime dreary	spit day	green warm	
175.	although baby	because work	sure cry	
176.	garment right	heavy wrong	clothes thing	
177.	rigid fraud	stiff quilt	upright fake	
178.	carpet tell	man me	rug some	
179.	church wet	together dry	reliction bog	
180.	joy book	happy read	happy read	

APPENDIX D
POST EXPERIMENT QUESTIONNAIRE

1. What do you think the purpose of this experiment was?
2. On what basis did you select words?
3. Did you notice anything about the words I said other than the fact that they followed your response?
4. What do you think was the purpose of my words?